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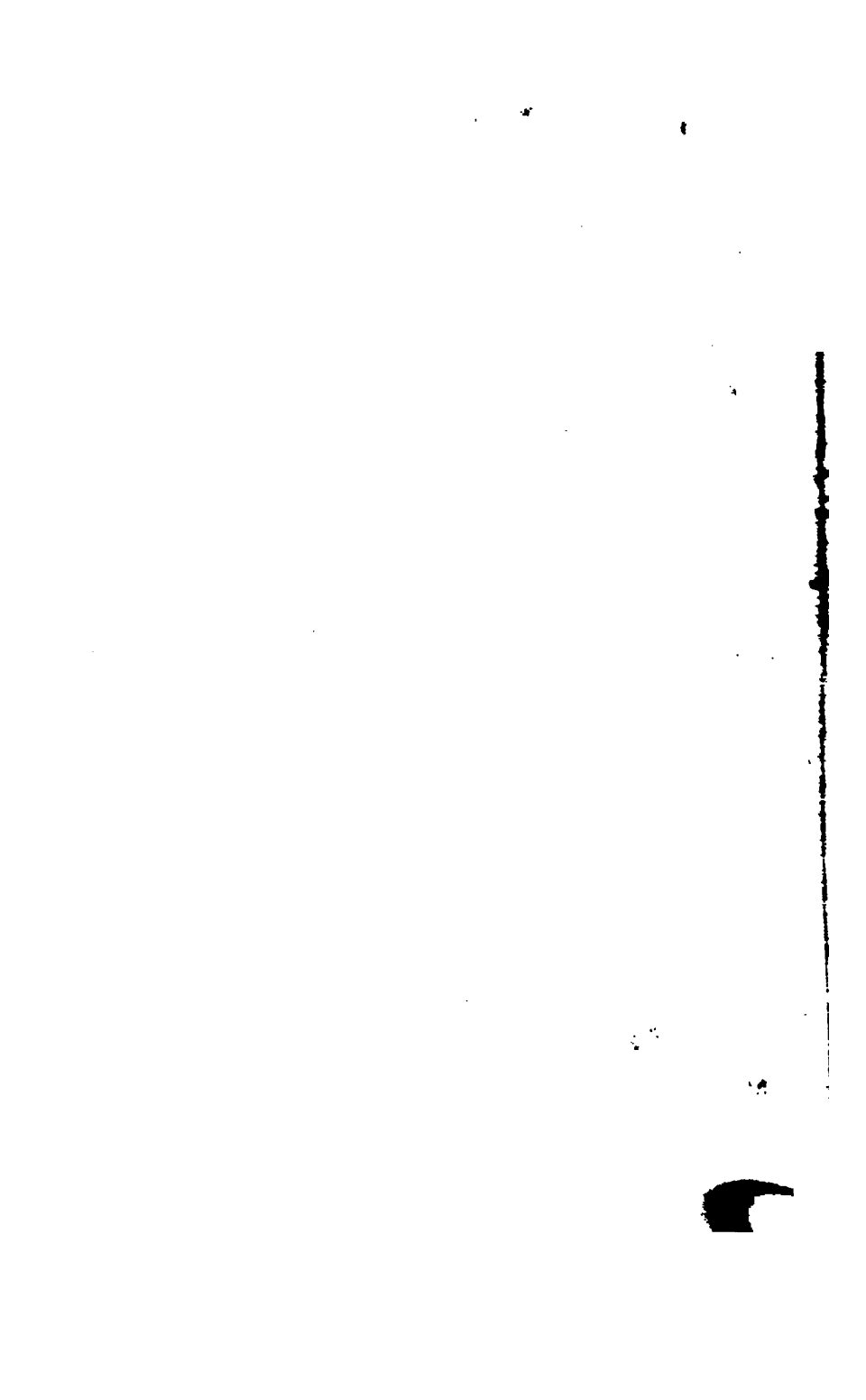
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A SYNOPTICAL GUIDE
TO THE
STUDY OF OBSTETRICS
—
HARRIS

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THE
STUDY OF OBSTETRICS

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I.

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A CLINICAL HISTORY of the MEDICAL and SURGICAL DISEASES of WOMEN. With 169 Engravings. 8vo. 28s.

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III.

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BEING AN AID TO THE STUDENT IN THE CLASS-ROOM
IN PRIVATE STUDY AND IN PREPARING
FOR EXAMINATIONS

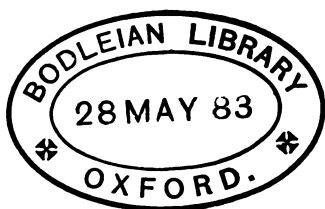
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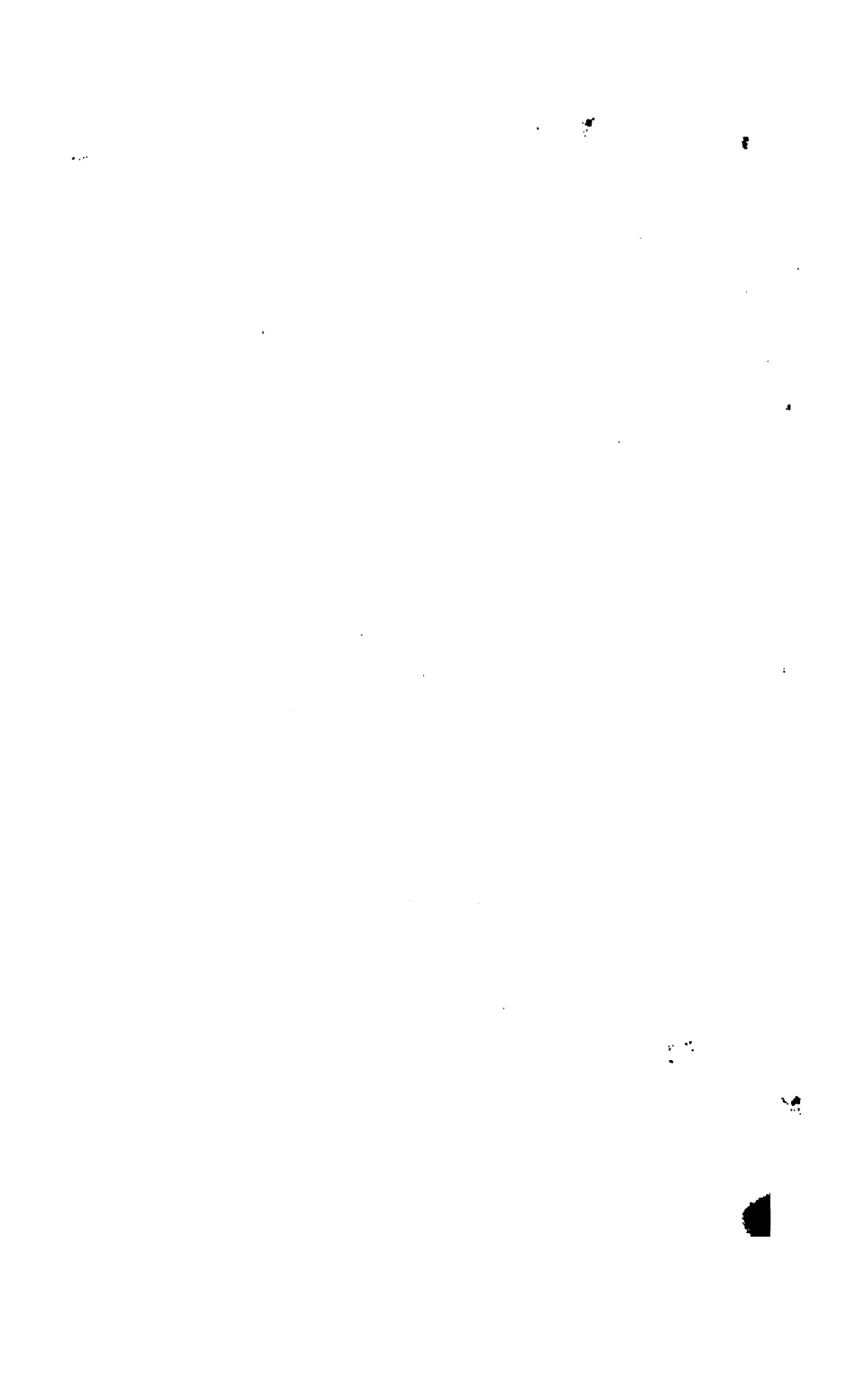


PREFACE.

THE PURPOSE of this publication is to serve as a guide to the study of Obstetrics. As a means of bringing the student into more intelligent sympathy with the teacher I have found it of great service. By using a synopsis of this kind, the teacher finds it easier to preserve an orderly method in the exposition of his matter. He may pass lightly over some points, and he may dwell upon others, illustrating by specimens, drawings, and extemporaneous diagrams and demonstrations, according to his sense of their relative importance and the needs of his class; but no point will altogether escape attention. Everything is noted, and if further development of a point is desired, it can be sought. On the other hand, the student's mind is prepared for the reception of the teacher's exposition by some indication of the subject of the lecture; and the heads set out enable him to keep steadily in view the connection of the parts in their relations, and as constituents of a whole.

Again, this Synopsis will prove valuable to the student who cannot attend systematic lectures. It will serve as a map showing him the extent and subdivisions of the







THE
STUDY OF OBSTETRICS

Planes.—Definition : imaginary levels passing through antero-posterior diameters and touching the sides. Three principal planes : brim, cavity, outlet.

Axes, three : (1) of the brim, perpendicular to middle of plane of brim ; (2) of outlet, perpendicular to plane of outlet ; (3) axis of pelvic canal, corresponding nearly with Carus' curve.

Variations of planes and axes in different attitudes.

Curves, two : (1) *Barnes' curve*, having for its centre the most projecting point of the sacral promontory ; (2) *Carus' curve*, drawn round symphysis pubis as centre.

Inclinations in upright and in crouched postures.

Diameters.—A. Of brim, three principal : (1) antero-posterior or conjugate, transverse, and oblique (right and left) ; three of cavity ; three of outlet. Changes in relative length of these diameters from brim to outlet ; conjugate shortest at brim, is longest at outlet ; consequent changes of position of foetal head in labour. (See p. 47.)

The sacro-vertebral angle.—Its variations ; its cardinal importance in labour, especially in contracted pelvis ; it governs the radius of Barnes' curve.

The sacral hollow.

Length of the anterior wall of the pelvis.

Inclines.—The lateral or vertical planes from brim of pelvis to outlet ; the convergence towards outlet ; the dividing ridge between anterior and posterior planes. Tyler Smith's view of their influence in rotating the head.

External measurements.—Use in estimating internal dimensions of pelvis.

Pelvimetry applied to obstetric practice.—Comparison between use of instruments and hand.

II.

THE PRÆ-GRAVID STATE. MENSTRUATION.

The structure and functions of the ovaries, uterus, and breasts.

The inter-reactions of these organs.

Periodicity—Law of.

Primum mobile in the ovary.

Maturation of ovum.

Extrusion of ovum from ovary, rupture of ovisac.

Constitutional reactions under ovarian stimulus preceding menstrual flow.

Nervous tension. •

Vascular tension.

Preparation of nidus in uterus by development of mucous membrane : decidua.

Reception of ovum in oviduct and uterus.

Up to this point menstruation is the simulacrum of gestation—a mimic gestation.

The ovum missing fertilisation, it breaks up.

The decidua breaks up.

There is hæmorrhagic discharge.

Subsidence of nervous and vascular tension—a missed pregnancy.

III.

THE GRAVID UTERUS.

THE SEROUS COAT.

In non-gravid state the peritoneum passes over fundus of bladder, on to body of uterus, point of reflection being nearly opposite os internum ; it covers the body of uterus behind, and dips as low as the upper fourth of the vagina ; thence it rises to cover the anterior wall of rectum. Thus it forms *Douglas' pouch*. (This pouch is generally deeper on the left than on the right side, so that blood tumours or bodies falling into the pouch are commonly felt by vagina more markedly on left.—R. B.)

Over fundus, union of serous membrane to the muscular wall is so intricate that it cannot be dissected off. Where it passes from bladder, connective tissue intervenes : this is seat

of serous effusion and thrombus under labour. Behind where it passes from uterus to rectum, also connective tissue. On either side some connective tissue surrounds the vessels which run to the sides of the uterus from the broad ligaments. Seat of serous and blood effusions and inflammatory deposits.

After labour *cracks* are sometimes seen in serous coat of uterus from distension.


THE MUSCULAR STRUCTURE.

1. *Body of uterus*: three layers: (1) composed of external layer with loop-like band over fundus, transverse fibres prolonged into broad ligaments and round ligaments, and circular fibres; (2) middle layer, with muscular bands forming loops and incomplete rings around the uterine vessels; (3) inner layer, with two triangular bundles, annular arciform and orbicular fibres having tubal openings for centre (Ruysch's muscles).

2. In *neck*, muscular fibres in two layers, continuous above with the outer and inner layers of the body; most of the fibres are annular or oblique; some form arches at the level of the arbor vitæ. The *os tincæ* is almost entirely formed of the inner layer.

The mucous membrane of the body of the uterus enlarges, thickens; its glands enlarge; the membrane forms folds, puckers, it becomes *decidua*. The ovum, fertilised in tube or in uterus, enters the uterine cavity; gets caught in a fold of decidua generally near its point of entry from tube; it grows at first by imbibition; then contracts adhesion to decidua by its chorion-villi shooting into decidua.

The ovum, buried in decidua in its growth, carries the free layer of this membrane into the cavity of the uterus; this free layer is the *decidua reflexa*; the membrane between placenta and uterus is the *decidua serotina*; that which preserves contact with muscular wall elsewhere is *decidua vera*. Ovum, still growing, carries its reflexa into contact and fusion with the



decidua vera, obliterating the uterine cavity. This takes place about third or fourth month.

Vessels from embryo carried by its allantois shoot into the chorion-villi to form foetal element of placenta. Arteries (helicine) shoot from uterus into decidua, and cells and sinuses are developed, constituting maternal element of placenta. The two elements meet, interdigitate, but maintain individual continuity. Maternal vessels bring blood from uterine arteries, and carry it back to uterine sinuses. Foetal arteries bring blood from foetus, and foetal veins carry it back.

Nourishment of foetus effected by balance of osmosis towards foetus.

The mucous membrane of the *cervix* remains as before; its glands are more developed, secreting the *mucous plug*; its vibratile cilia remain.

PROPERTIES OF THE GRAVID UTERUS.

1. Contractility; 2. Retractility; 3. Irritability; 4. Sensibility; 5. Elasticity.

All hollow organs provided with sphincters are subject to these laws. Gestation creates no new property (Pajot).

Muscular action of uterus tends to diminish cavity of body by concentric contraction; to expel contents through cervix by shortening; the contained body stretching open the cervix (Murphy's exposition).

When empty further contraction expels fluid from substance of uterus, and flattens anterior wall upon the posterior, the condition of non-pregnant organ.

The *round ligaments* contain muscular fibres (Rainey). These draw the uterine body forwards.

Situation of gravid uterus: in anteversion, and generally inclined obliquely to the right; in some cases there is a degree of rotation.

Relations: *anterior surface* immediately behind abdominal wall; *posterior surface* applied to rectum, sacro-vertebral angle,

lumbar vertebræ, aorta, vena cava (kidneys and renal vessels commonly escape pressure); *upper border of fundus* in contact with transverse colon, large curvature of stomach, anterior edge of liver; *lateral borders*, iliac vessels below psoas-iliac muscles; above, the *right* border, to cæcum and colon; the *left* border, to sigmoid flexure and small intestine.

Capacity.—Of nulliparous uterus, 2–3 centim.; of multiparous uterus, 2–5 centim.; of uterus at term (J. Y. Simpson), 6 to 8 litres (10 to 14 pints), 4 to 5 litres (7 to 9 pints) (Tarnier).

Weight.—Nulliparous, 360 to 1,000 grains; non-pregnant of parous uterus, 1,200 to 1,800 grains (42–55 grammes); of gravid uterus at term, with contents, 12 to 15 pounds (6 to 7 kilogr.); empty, 30 to 40 ounces. Hence gravid uterus without adnexa may be said to weigh twenty times more than the non-gravid.

Dimensions of gravid uterus after labour vary with degree of contraction and time elapsed.

Shape.—From triangular, gravid uterus becomes pyriform, then at third month spheroidal, the fundus growing most, and at end the lower segment grows, and the shape is more pyriform again.

PLACENTA.

Maternal surface shows: (1) Oblique and valvular openings of sinuses; (2) cork-screw arteries; (3) cellular system; (4) cotyledons generally distinct by decidua dipping between, but insufflation of one cotyledon sometimes blows up the rest; (5) the circular vein; (6) decidual shreds.

Fœtal surface: (1) Large vessels gathering to form umbilical cord; (2) covered by amnion and chorion.

Umbilical cord: Composed of (1) two arteries, one vein; (2) Wharton's jelly, a mucous connective tissue; (3) investment of chorion and amnion; (4) atrophied traces of omphalomesenteric vessels, vitellary duct and canal of allantois.

Spiral disposition of arteries around vein; most commonly spiral turns from right to left.

Length.—Usual, 18 to 20 inches; exceptional, 60 inches.

Strength.—May support a weight of 10 to 20 pounds or more, therefore more than average weight of child ; but it has broken under weight of child.

Attachments.—By one end to fœtus at umbilicus ; by other to fœtal surface of placenta in centre or on margin or in intermediate positions, governed by seat of attachment of placenta to uterus. Central when placenta is attached to fundus ; it springs from lower edge when placenta dips into the lower polar circle. The seat occupied by placenta is determined by noting the distance of the rent made in the membranes by the child at birth. This rent is over the os internum (Levret ; R. B.).

Deviations in form of placenta and cord.—1. The cotyledons are separate, or one or more are detached from main body. Vessels run across intervening chorion-spaces to communicate ; *placentæ succenturiatæ*. 2. *Diffused* placentæ covering the whole or large part of chorion.

Deviations typified in placenta of other mammalia.

Cord may be excessively thick from excess of Wharton's jelly ; presenting tumours ; knots ; from opening of umbilicus it may admit fœtal intestine.

Area of placenta=60 to 70 square inches.

Area of placental seat when placenta is cast, 10 to 16 square inches (R. B.).

Placenta is attached to uterus by—(1) decidua ; (2) vessels passing between ; and (3) slightly by chorion-villi running into uterine sinuses.

These bonds are all delicate ; separation is effected by reduction of uterine surface from coincidence with area of placenta to the area found after expulsion of contents.

NERVES AND VESSELS OF UTERUS.

Nerves come from renal plexus and inferior mesenteric ; others from hypogastric plexus, sacral plexus, from ganglia of great sympathetic.

Arteries from hypogastric become uterine arteries ; utero-ovarian artery. They all anastomose ; the helicine disposition ;

ultimate ramifications to mucous membrane. In gravidæ these enlarge and project helicine shoots to placenta.

Veins.—The uterine sinuses (enormously enlarged in gestation) run to venous plexuses in broad ligaments, then to iliac veins.

Lymphatics greatly developed in gestation and puerpery, having important work. Four planes in thickness of uterus. Two groups: of neck which runs to pelvic ganglia; of body which run to lumbar ganglia.

THE BREASTS.

Dependencies of the skin.—The areola presents elevations due to sebaceous glands; the tubercles of Morgagni. Orifices of galactophorous ducts.

Structure of breast.—An envelope of skin; adipose tissue; the mammary gland—all united by very firm connective tissue; a thin layer of muscular fibres in circles round nipple; Meyerholz's muscle converging towards nipple.

Mammary gland.—Its base, flat or convex, rests upon the pectoral muscle; secreting glandular acini, galactophorous ducts.

Milk likened by Virchow to a fat or sebaceous secretion.

Milk formation during gestation.

Association with glycosuria (Sinéty) and fatty liver (Tarnier).

Milk in breasts of new-born infants and men.

THE EMBRYO AND FÆTUS.

HISTORY: DEVELOPMENTAL, CLINICAL, LEGAL.

The fruit is called *embryo* until the fourth month, thence it takes the name of *fœtus*.

Observations on the embryo during the first three weeks are rare. After this time they become more frequent and precise.

SUMMARY OF THE PRINCIPAL EPOCHAL EVENTS IN THE DEVELOPMENT OF EMBRYO AND FŒTUS.

Within first month.—Amnios and umbilical vesicle formed; dorsal cord; heart; vitelline membrane gone; allantois; cerebral vesicles; liver; lungs; pancreas.

Second month.—Limbs sketched out; primitive aorta divides into aorta and pulmonary artery; some ossific points; some muscles; vertebral column; bladder, kidneys, tongue, larynx, thyroid, genital tubercle; crystalline capsule, and membrana pupillaris; separation of ventricles of heart. Head forms more than two-thirds of the body.

Third month.—Corpus striatum. Osseous points in bodies of vertebræ; foetal placenta; sexual distinction; ossific points in cranial bones; pons varolii; mammary glands; prostate.

Fourth month.—*Fœtus*; fontanelles and sutures wide.

Fifth month.—Caducous membranes begin to coalesce; ossification more advanced; tooth-germs of permanent teeth; sweat-glands; Brünner's glands; lymphatic glands.

Sixth month.—Ossific points of vertebræ more advanced; papillæ of skin; sebaceous glands; Peyer's patches.

Seventh month.—Cerebral convolutions; island of Reil; disappearance of membrana pupillaris.

Eighth month.—Ossific points in body and horns of os hyoides; opening of eyelids; testicles in scrotum (Beaunis et Bonchard).

FŒTUS AT TERM.

From the aggregation of the different signs of maturity, not from any one singly, the fœtus at term is recognised.

	Mean weight in primiparæ	Mean weight in multiparæ
<i>Weight.</i> —Boys 3164 grammes=7½ lbs.		3372 grammes=8 lbs.
Girls 3101 „ =6½ lbs.		3120 „ =7 lbs.
		(Tarnier.)

Influence of race; of age of parents.

Cases of exceptional weight: 5450 grammes=12 lbs. (Tar-

nier); 5500 grammes (Hecker); 9 kilogr.=19 lbs. (Caseaux); 17 lbs. (R. B.).

Length.—50 to 60 centim.=20 to 24 in.

Place of insertion of cord.—Slightly below the median point.

State of external surface.—Generally somewhat plump; buttocks, mammary regions, belly prominent. Skin rosy, sebaceous coating; downy hair on body; nails firm, extend beyond the finger-tips. Scrotum red, holds testicles. Labia minora sometimes uncovered.

State of internal organs.—1. *Thorax.*—*Thymus*, very large, overlapping heart. *Lungs before breathing*: red, firm, homogeneous, sink in water. *Atelectasis*: right lung more prominent. *After breathing*, lungs generally enlarged; anterior borders meet.

Heart before breathing.—The right lung and thymus together nearly fill the right side of the thorax. *After breathing* the left lung pushes the heart a little to right. Centre of heart is nearer to the upper end of the vertebral column than to the lower; but is very nearly equidistant; it is nearer the pelvic end of the foetal ovoid than the cephalic (Ribemont).

2. *Abdominal organs.*—*Liver* large, fills nearly half abdominal cavity. (The presence of liver in lower abdominal zone source of danger from pressure of obstetric hand in turning.) *Spleen*: Anterior surface covered by liver. *Stomach*: Walls not in contact, an actual cavity (Ribemont), covered by liver, in contact with spleen and pancreas. *Small intestine* = twelve times the length from mouth to anus. *Suprarenal capsules*: Size equal one-third of kidney; form irregular, somewhat pyramidal; partly capping kidney; tissue shows two zones: one peripheral, violet-coloured, the other central, much darker. *Large intestine* filled with meconium. *Ovaries* in abdominal cavity.

Point of ossification of inferior epiphysis of femur.—Sometimes seen before maturity, and may be wanting at maturity (Hecker).

The foetal head: composed of *cranium* and *face*—*cranium*

of paramount interest. Cranium consists of *vault* and *base*; base is more solid than vault. Vault shows two *fontanelles*; anterior or *bregma* lozenge-shaped; posterior triangular; *sutures*, *sagittal*, antero-posterior from root of nose to superior angle of occipital bone; the membranous interval between frontals and parietals; it is crossed by the *fronto-parietal* and *transverse* or *coronal suture*; *occipito-parietal* or *lambdoidal suture*. *Occipital joint*: between the expanded part of the occipital and its basilar apophysis there is a cartilaginous union permitting movements of flexion and extension (Budin). This disposition contributes to the plasticity of the head in labour, provided for by the membranous sutures and fontanelles.

DIAMETERS AND CIRCUMFERENCES OF HEAD.

Four antero-posterior diameters: (1) *Maximum*, from chin to sagittal suture; (2) *occipito-mental*; (3) *occipito-frontal*; (4) *suboccipito-bregmatic*.

Three transverse diameters: (1) *Bi-parietal*; (2) *bi-temporal*; (3) *bi-mastoid*. The bi-parietal may be shortened by compression; the others not.

Two vertical diameters: (1) *Fronto-mental*; (2) *cervico-bregmatic*.

Two principal circumferences: (1) *Greater*, passing through the ends of the maximum diameter; (2) *lesser*, passing ends of sub-occipito-bregmatic diameter.

The diameters given in text-books fallacious, because taken on heads after plastic deformations of labour. Head before labour is nearly spherical; after labour in occipito-anterior presentation, conico-cylindrical (R. B.). Tarnier says measurements taken 40 and 72 hours after labour, when head has regained its original shape, are truer. But head never quite recovers its ante-partum shape (R. B.; Budin).

Articulation of head with vertebral column.—The atloïdo-occipital articulation very close: *movements of flexion and extension* chiefly take place in cervical vertebral articulations.

Rotation-movements to one-quarter of a circle take place to right or left on atloïdo-axial articulation. Rotation to extent that face looks directly back may be produced without lesion (Tarnier). Doubtful (Ramsbotham; R. B.).

Dimensions of trunk.—Diameters: (1) *Bis-acromial*, or transverse; (2) antero-posterior, or *sterno-dorsal*. Transverse, capable of great reduction under pressure. *General rule*: Where the head can pass, the shoulders and trunk rarely fail to pass easily.

Three diameters of pelvis: (1) *Transverse, bis-iliac*; (2) *antero-posterior pubio-sacral*; (3) *bi-trochanteric*.

Pelvic diameters of fœtus may be increased by legs flexed upon body, but the cone so formed may be decomposed by bringing down legs in extension.

The diameters of the trunk are all smaller and more reducible than those of head.

The antero-posterior diameters of the trunk are shorter than the transverse, the opposite to what obtains in the head. Hence the rotation-movement of trunk during expulsion.

(*The measurements of head given under Labour, see p. 49.*)

FUNCTIONS OF THE FŒTUS.

CIRCULATION; RESPIRATION; NUTRITION; SECRETIONS; INNERVATION.

A. Circulation.—*First circulation, circulation of the umbilical vesicle, or omphalo-mesenteric circulation; second circulation, or placental; third, at birth the placental circulation is transformed into pulmonary.* 1. In embryo, heart forms two ventricles, two auricles, these communicating by foramen Botallii. *Arterial system*: aorta formed later, external iliacs give off umbilical arteries; other arteries, systemic, are developed. *Venous system*: from allantoid vesicle run two veins, the *umbilical allantoid* or *placental veins*. One vein atrophies, the other becomes

the *umbilical vein*. Liver and vena portæ form; then vena cava, inferior and superior, bring blood to right auricle.

2. *The placental circulation* at third month supplants the omphalo-mesenteric circulation. The characters are: the foramen of Botal, the ductus arteriosus, ductus venosus, umbilical arteries, and vein. Blood driven from left ventricle to aorta; from right ventricle to pulmonary artery. Blood driven into aorta goes chiefly to head and arms; blood driven into pulmonary artery goes chiefly by ductus arteriosus into aorta; very little going to lungs. The mixed blood is distributed to body and legs, and to placenta by umbilical arteries. The blood is brought back from placenta, where hæmatosis takes place, by umbilical vein, and is parted into two currents: one takes the ductus venosus of Arantius, the other ramifies in the liver in the branches of the vena portæ. From the ductus venosus the blood passes into vena cava inferior, which takes also to the heart the blood collected from lower trunk, legs, abdominal organs, and liver. From right auricle, blood directed by Eustachian valve to left auricle and ventricle to recommence the course described. The blood distributed to head and arms is brought back to right auricle by vena cava superior, thence to right ventricle, thence to pulmonary artery. All the blood serving foetal organs is mixed; the liver takes the purest blood; then the head and arms; then the trunk and legs.

3. *Transformation of foetal circulation into ultimate circulation*.—Suppression of function of placenta; establishment of pulmonary respiration; obliteration of umbilical arteries, vein, and ductus venosus; establishment between heart and lungs of *lesser circulation*. Afflux of blood to lungs on first inspiration, with arrest of current to aorta through ductus arteriosus, and atrophy of this duct. Blood returns from lungs to left auricle and opposes the passage of blood from right auricle through foramen of Botal. Gradual closure of this foramen.

B. *Respiration*.—*Blood-phase*.—Blood from foetus under goes hæmatosis in placenta, drawing oxygen from maternal

blood. The experiments of Zweifel proving this. Clinical proofs: arrest of placental circulation excites respiratory efforts; and fœtus dies of asphyxia.

Tissue-phase.—Marked accumulation of material which has to be burned later on; action chiefly formative; fœtus wants O less than adult; its heat is maintained by mother; its temperature after birth. But fœtus has its proper animal heat (Fehling). Lesser combustion in fœtus enables it to resist asphyxia longer, that is for five, ten, or fifteen minutes.

c. *Nutrition* — At first derived from *discus proligerus*, albumen secreted in Fallopian tube; then from liquids secreted by uterine mucous membrane; then from umbilical vesicle. Question of nutritive material from liquor amnii answered in negative. Endosmosis and exosmosis between fetal and maternal vessels in placenta. Solid matters and fat cannot pass. At first, albuminoid substances share almost exclusively with mineral salts in nutrition of fœtus. Proportion of inorganic substances increases as gestation proceeds. This is connected with ossification of fœtus (Fehling). Iodide of potassium, potassic chlorate, &c., given to mother, found in urine of new-born child (Gusserow, Porak). Chloroform given during labour found in new-born. Endosmosis towards fœtus in early gestation promoted by more watery character of its elements. Endosmosis becomes slower towards fœtus in later months as maternal blood gets more watery, and fetal blood thicker (Fehling).

Glycogene.—Sugar is formed in placenta at first, later in liver (Cl. Bernard).

d. *Secretions.* — *Vernix caseosa*, secreted by sebaceous glands of skin. *Meconium*, constituents of: epithelium cells, intestinal secretions, bile. *Serosity* in serous cavities. *Urine*: at first, function of kidneys performed by Wolffian bodies. Bladder at birth holds urine. Does fœtus pass urine into liquor amnii? Urea in liquor amnii.

Placenta executes wholly or partially functions of respiration, hæmatisis, liver, kidney, skin (R. B.)

E. *Innervation*. — Brain inactive; reflex function active. Probable sleeping and waking (Tarnier).

IV.

NATURAL HISTORY OF THE PROCESS OF GESTATION.

Menstruation the forerunner of pregnancy.

The ovum is met by the spermatic element.

The vitalised ovum preserved from decomposition.

The decidua preserved becomes further developed.

The ovum grafted on decidua.

Nervous and vascular tension maintained and increased.

Reproduction consists of three stages or epochs.

Ovulation, the function of the ovary	} Genesial cycle of Tyler Smith.
Gestation " " uterus	
Lactation " " breasts	

Ovary, uterus, and breasts reign by turns.

Fertilisation of the ovum; copulation and insemination and fertilisation distinguished.

INFLUENCE OF IMPREGNATION UPON THE SYSTEM OF THE MOTHER.

Law—Pregnancy the Great Test of Bodily Soundness.

Pregnancy opens up a great field for physiological study.

1. *Modifications of the nervous system* :—

Increased physical mobility.

 " emotional "

 " diastaltic "

Increased tension regulated by vomiting.

Is there increase of nerve-tissue?

Do increased nerve-energy, increased nutritive energy, and development of nerve in uterus imply increase of nervous elements in nervous centres?

2. *Changes in the blood.*—Increase of blood-mass.

Change of constituents.

Red globules diminish; white globules increase.

Albumen diminishes.

Fibrin at first diminishes; towards end increases.

Iron diminishes; increase of water.

Relative anæmia.

3. *Changes in the circulating organs.*—The heart undergoes hypertrophy.

New vessels are developed.

Pelvic vessels enlarge.

Capillaries all over body fuller.

Increased vascular tension. Sphygmograph.

Mechanical inferior venous hyperæmia. } de Cristoforis.

„ superior arterial „ }

The theory of pressure on abdominal vessels.

Sounds of the heart; the bruit-de-souffle of the last three months.

Heart beats more rapidly—pulse.

4. *Changes in the respiratory apparatus.*—Change of form of chest.

Capacity of chest diminished.

Respirations increased.

Dyspnœa easily induced.

Chemical changes of respiration.

Carbonic acid increased.

Animal heat increased.

5. *The liver.*—Tarnier's account of fatty change associated with glycosuria.

Hyperæmia; increased functional activity.

6. *The kidney*.—Transient granular change. Hyperæmia.

The urinary apparatus.—Bladder, urethra, and meatus urinarius drawn upwards.

Urine, characters of.—Reaction.

Water increased.

Increase of chlorides.

Diminution of phosphates, sulphates, and urea.

Occasional appearance of albumen and sugar or glucose.

Kyestein.

7. *The digestive apparatus*—Affected mechanically and functionally.

Intestines compressed backwards.

Intestinal glands more vascular and active.

Appetite increased or changed in character.

8. *The skin*.—Stretching of skin of abdomen and breasts.

Pigmentation.

Nævi become more vascular.

Increase of glandular activity.

Growth of hair stimulated.

The osseous system.—Softening of the pelvic joints.

Incurvation of the spine.

Changed relation of axis of pelvis to horizon.

Osteophytes.

9. *The body-weight*.—Gassner's observations on increase of weight.

Absorption of fat.

The changes, structural and functional, arising in gestation considered in their solidarity.

V.

INDEX TO DISCUSSION OF SIGNS AND DIAGNOSIS OF PREGNANCY FOR CLINICAL AND LEGAL PURPOSES.

The problems presented :—

1. Is the subject pregnant ?
2. Is the pregnancy single or multiple ?
3. Is the pregnancy simple or complicated with diseases general or local, as tumours, etc. ?

4. The epoch of the pregnancy ?

The signs are : (1) Subjective ; (2) objective.

- They give : (1) Evidence presumptive ; (2) probable ; (3) certain.

The duty of the physician towards the patient and the law.

The signs are divided into those of three stages, each embracing three months.

SIGNS DEVELOPED DURING THE FIRST TRIMESTRIUM.

The subjective signs.

The objective signs.

A. *Changes in the nervous system.*

B. *Changes in the vascular system.*—Arterial tension : sphygmographic observations.

General capillary fulness.

Suspension of menstruation.

Purple colour of vulva, vagina and vaginal-portion, anus, and rectum. Capillaries and small vessels of the skin.

The creamy discharge of the vagina.

C. *Changes in the glandular system.*—Changes in the breasts.

Enlargement, elasticity, veins, glandules of the areola, darkening of areola ; milk.

D. *Changes in the skin and mucous membranes.*—Vascularisation.

Pigmentation.

E. *Changes in the uterus and vagina.*—Colour (described under B and D).

1. Increase of size and weight.
2. Changes of shape.
3. Changes of position and relation to other organs.

All determined by touch.

Mode of examining.

Nutation of the body of uterus forward.

Rising of vaginal portion and os externum under promontory of sacrum.

Anterior vaginal roof-stretching.

Gradual evolution of the objective signs during the first, second, and third months.

Individual, cumulative, and aggregate value of the signs.

SIGNS DURING THE SECOND TRIMESTRIUM.

The signs of the first trimestrium continue.

New signs are added.

Increase of uterus in size.

Rise of fundus above symphysis pubis.

Auscultation signs.—1. The uterine sounds. Theories of cause, significance, fallacies.

2. Sounds produced by movements of the fœtus.

3. The foetal heart sounds.

When first heard.

Rate in the two sexes.

4. The umbilical souffle.

Significance: a living child; test of its vigour; indicates position and presentation of child.

Signs brought out by palpation and percussion.—1. The

position of the fundus uteri above the symphysis pubis. Its gradual rise in successive months.

2. Rhythmical movements of the uterus (Tyler Smith; Braxton-Hicks).

Ballottement through the abdominal wall; fluctuation, elasticity.

Ballottement by vaginal touch.

The breast signs are further developed.

Appreciation of the signs individually and in the aggregate.

SIGNS DURING THE THIRD TRIMESTRIUM.

The signs of the first and second trimestrium continue and are accentuated.

Continuous enlargement of the uterus.

Rise in abdomen.

CHANGES UNDERGONE IN THE CERVIX AND LOWER SEGMENT OF UTERUS THROUGHOUT PREGNANCY.

Changes of shape—(1) During the first eight and a half months; (2) during the last fortnight.

Bandl's ring.

Changes of situation and direction—(1) In early gestation; (2) in latter months.

Softening.—Gradual from below upwards.

Obliteration during the last fifteen days from above downwards, frequent.

State of the orifices of the uterus.—1. From commencement of gestation to the moment of obliteration of neck.

In *primiparæ* the *os externum* becomes oval or circular, and is smooth, slightly open.

2. In *pluriparæ* the *os externum* is larger, gaping, yielding before the finger; presents fissures results of rents in labour; sometimes edges are everted. With advance of pregnancy

finger penetrates further, so that at eight and a half months the tip reaches the os internum.

3. The state of *the os internum* is not constant. Generally closed in primiparæ until last month. In pluriparæ it may admit tip of finger even in the early months.

4. State of orifices during obliteration of neck. Until eight and a half months the os internum and os externum exist. Then obliteration setting in, the os internum disappears and is replaced by a ring of the neck immediately above the part which is just obliterated.

5. State of os externum after obliteration of the neck.

It persists.

In *primiparæ* it is comparatively small and tight; sometimes towards end, smoothed down to level of fundus vaginæ.

In *multiparæ* the os externum is irregular, gaping, easily penetrated by finger, which reaches the membranes; swollen, and projecting into vagina.

General conclusions: what signs are—(1) Presumptive; (2) probable; (3) certain.

PLURAL GESTATIONS.

Frequency in France, 1 in 92; Germany, 1 in 84; Great Britain, 1 in 63 (Dubois). *Influence of race; development of ovaries; multiparity; heredity; age.*

Theories of: (1) Two or more Graafian vesicles from same or different ovaries may burst at same time; (2) two ovules may exist in one vesicle; (3) one ovule may contain two germs. When one is contained in the other = *fetal inclusion*.

Superimpregnation.—The ovules are fecundated by different coitus or by same coitus. If by several coitus, there is *superimpregnation*. This is divided into *superfecundation* and *superfetation*.

A. *Superfecundation.*—Coitus within same ovulation period. Examples of black and white twins.

Rotation-movements to one-quarter of a circle take place to right or left on atloïdo-axial articulation. Rotation to extent that face looks directly back may be produced without lesion (Tarnier). Doubtful (Ramsbotham; R. B.).

Dimensions of trunk.—Diameters: (1) *Bis-acromial*, or transverse; (2) antero-posterior, or *sterno-dorsal*. Transverse, capable of great reduction under pressure. *General rule*: Where the head can pass, the shoulders and trunk rarely fail to pass easily.

Three diameters of pelvis: (1) *Transverse, bis-iliac*; (2) *antero-posterior pubio-sacral*; (3) *bi-trochanteric*.

Pelvic diameters of fœtus may be increased by legs flexed upon body, but the cone so formed may be decomposed by bringing down legs in extension.

The diameters of the trunk are all smaller and more reducible than those of head.

The antero-posterior diameters of the trunk are shorter than the transverse, the opposite to what obtains in the head. Hence the rotation-movement of trunk during expulsion.

(*The measurements of head given under Labour, see p. 49.*)

FUNCTIONS OF THE FŒTUS.

CIRCULATION; RESPIRATION; NUTRITION; SECRETIONS; INNERVATION.

A. Circulation.—*First circulation, circulation of the umbilical vesicle, or omphalo-mesenteric circulation; second circulation, or placental; third, at birth the placental circulation is transformed into pulmonary.* 1. In embryo, heart forms two ventricles, two auricles, these communicating by foramen Botallii. *Arterial system*: aorta formed later, external iliacs give off umbilical arteries; other arteries, systemic, are developed. *Venous system*: from allantoid vesicle run two veins, the *umbilical allantoid* or *placental veins*. One vein atrophies, the other becomes

the *umbilical vein*. Liver and vena portæ form; then vena cava, inferior and superior, bring blood to right auricle.

2. *The placental circulation* at third month supplants the omphalo-mesenteric circulation. The characters are: the foramen of Botal, the ductus arteriosus, ductus venosus, umbilical arteries, and vein. Blood driven from left ventricle to aorta; from right ventricle to pulmonary artery. Blood driven into aorta goes chiefly to head and arms; blood driven into pulmonary artery goes chiefly by ductus arteriosus into aorta; very little going to lungs. The mixed blood is distributed to body and legs, and to placenta by umbilical arteries. The blood is brought back from placenta, where hæmatosis takes place, by umbilical vein, and is parted into two currents: one takes the ductus venosus of Arantius, the other ramifies in the liver in the branches of the vena portæ. From the ductus venosus the blood passes into vena cava inferior, which takes also to the heart the blood collected from lower trunk, legs, abdominal organs, and liver. From right auricle, blood directed by Eustachian valve to left auricle and ventricle to recommence the course described. The blood distributed to head and arms is brought back to right auricle by vena cava superior, thence to right ventricle, thence to pulmonary artery. All the blood serving fœtal organs is mixed; the liver takes the purest blood; then the head and arms; then the trunk and legs.

3. *Transformation of fœtal circulation into ultimate circulation*.—Suppression of function of placenta; establishment of pulmonary respiration; obliteration of umbilical arteries, vein, and ductus venosus; establishment between heart and lungs of *lesser circulation*. Afflux of blood to lungs on first inspiration, with arrest of current to aorta through ductus arteriosus, and atrophy of this duct. Blood returns from lungs to left auricle and opposes the passage of blood from right auricle through foramen of Botal. Gradual closure of this foramen.

B. *Respiration*.—*Blood-phase*.—Blood from fœtus undergoes hæmatosis in placenta, drawing oxygen from maternal

Is there a *special individual gestation period*?

The *special individual menstrual type*.

The argument of analogy from animals.

Latitancy of the ovum and spermatozoa.

The sources of fallacy in estimating duration of gestation.

Conclusions.—1. A well-developed child indicates a gestation of *at least 260 days* from the fruitful coitus, and justifies suspicion that the fruitful coitus took place at an earlier date.

2. The most common time observed is 270–275 days.

3. A not uncommon time observed is 275–280 days.

4. Cases of children apparently carried more than 280 days are exceptional, and every day exceeding 285 renders the accuracy of the computation—that is, of the date of fruitful intercourse—doubtful in accelerating ratio.

What is the *ultimum tempus pariendi*?

The *prediction of the day of labour*.

The *limits of the capacity for reproduction in woman*.

The earliest age.

The latest age.

The *care of the pregnant woman*. Importance of exercise to maintain activity of secreting and excreting organs.

Pathological states which simulate pregnancy.—Pseudocyesis of hope and fear, and climacteric.

Dermoid and ovarian cysts. Hepatic and renal cysts.

Enlargement of uterus from fibroid or sub-involution.

Ascites.

VI.

INDEX TO THE STUDY OF THE DISEASES OF PREGNANCY.

'Fœmina plurimis afficitur malis ex solâ graviditate oriundis.'—BOERHAAVE.

Aphorism: Pathology is Physiology working under difficulties.

General Propositions.—1. The diseases of the gravida may be divided into—

A. Pathological exaggerations of the physiological conditions of pregnancy.

B. Pathological processes continued from the præ-gravid state, or grafted upon the gravid state. In either case the disease in its origin, independent of gravidity, becomes modified by the gravidity.

2. The diseases of pathological exaggeration of the grvida are diseases of high nervous and high vascular tension, and the pathological processes originating independently of the gravid process also fall under the influence of the high tension of gravidity.

3. The diseases of puerpery are, on the other hand, diseases of low nervous and vascular tension.

4. The gravid state does not easily tolerate the concurrent course of physiological processes carried to excess, or of grafted pathological processes.

5. Hence abortion is a frequent consequence of disease in the grvida.

6. Abortion, then, is an indication of a system or organ overtaxed, or of disease ; and is a means adopted by nature for relief or cure. That is to say, abortion is often conservative as regards the mother.

7. Gestation evokes latent morbid conditions.

8. Gestation disposes to the generation and aggravation of disease ; puerpery to the generation of disease, and increases the susceptibility to the invasion of zymotic or infectious diseases.

9. Gestation is a test of the soundness of the subject.

10. Physiological processes strained to excess do not necessarily produce abortion. They may imperil or destroy the mother and child.

11. Salivation, pyrosis, hydrorrhœa gravidarum, vomiting, diarrhœa, hæmorrhages—as hæmoptysis apart from tuberculosis, hæmatemesis, melæna, hæmaturia, bursting of superficial veins, hæmorrhage from cervix uteri and vagina sometimes, by regulating nervous and vascular tension, avert abortion and other evils.

12. Independent morbid processes also do not always lead to abortion. When abortion does not ensue, the morbid processes already in action are likely to be intensified.

13. Most of the diseases arising out of excess of physiological actions may, when the gestation is at an end, disappear, leaving no evidence of organic lesion.

A. Pathological exaggerations of physiological conditions proper to pregnancy, or pathological conditions arising in the previously healthy woman under the influence of gestation.

1. *Neuroses*.—Increased diastaltic susceptibility disposes to convulsions, vomiting. Increased vascular tension disposes to serous and hæmorrhagic effusions into brain. Pruritus, neuralgia, cramps, various forms of paralysis, amaurosis, deafness, hemiplegia, paraplegia; cerebral thrombosis or embolism.

Most of the neuroses may be associated with albuminuria. At the head is convulsion, so-called *puerperal eclampsia*.

Symptoms and course of albuminuria gravidarum.—Anasarca, amaurosis, deafness, vertigo, headache; abortion or convulsion may follow.

Convulsion.—The *fit*, sudden or after premonitory symptoms in last paragraph. Three stages of fit: (1) the convulsion; (2) the coma; (3) the remission; the coma may persist. Extreme irritability of diastaltic system: tetanoid.

The *præ-albuminuric stage* (Mahomed).

Consequences of albuminuria and convulsions.—Abortion; recovery complete or incomplete, remanent neuroses or damaged kidney; phlegmasiæ; death from shock, effusions on brain or lungs; hæmorrhages.

Morbid anatomy.—Brain, œdema, anæmia, blood effusion; lungs, œdema; spleen large; kidney, three degrees of Bright's disease.

Theories of pathology.—Super-albuminosis of blood (Gubler); serous plethora (Caseaux); disease of kidney (Braun); alteration of nervous centres; pressure on kidneys and emulgent vessels (Lever); labour pains; uræmia, ammonæmia, urinæmia; toxæmia acting on nervous centres.

Connexion between albuminuria and convulsion.—(1) Albu-

minuria may exist without being attended by convulsion; (2) convulsion may occur without albuminuria; (3) albuminuria may come on after the convulsion (Depaul, Hicks).

Appreciation.—Fits independent of albuminuria may be epileptic; true eclampsia may break out in præ-albuminuria stage. The most plausible theory combines most of preceding theories. At root of all lie the exalted nervous and vascular tension; urinæmia and other conditions follow closely linked.

Treatment.—Prophylactic (1) during albuminuria; next to guard against after-effects; absolute milk diet (Tarnier); absolute rest; (2) remedial, during eclampsia; (3) restorative. 1. *Prophylactic*: to moderate nervous and vascular tension; bromides, digitalis, salines, aperients, question of bleeding. 2. *Remedial*, as in (1), and chloral, chloroform, nitrite of amyl, nitro-glycerine, morphia subcutaneously. Guard the tongue from being bitten. Pilocarpine? (Hyernaux). Question of inducing labour; wise if a fit occur. Intravenous injection of saline fluids or blood in extreme cases. 3. *Restorative*: milk diet, quinine; promote action of skin. *General rule.* No manipulation, no operation except under chloroform.

The *child*, imperilled, may suffer convulsions in utero, and after birth; sometimes escapes, unharmed.

Vomiting in excess of physiological rule, may end in death, in abortion, tendency to subside after three months. *Causes* alleged, metritis, displacement of uterus, distension of uterus, gastric irritation, albuminuria, liver disease. It is a diastaltic affection, not properly a disease of stomach. Increase of centric irritability as disorder persists. Starvation, self-empoisonment, emaciation, marasmus may ensue. *Treatment*, if obstinate, dilatation of cervix uteri (Copeman), if albuminuria or advancing emaciation, with rise of temperature, question of inducing abortion. In extreme cases, subcutaneous injection of morphia, ether; intravenous injection of saline solution or transfusion of blood. General indications as in puerperal convulsions.

Similar principles apply to the hæmorrhages and other diseases of gestation.

The *child* probably survives as long as gestation.

General propositions.—Diseases depending upon gestation cannot always be successfully treated, if the gestation continues. Intensity of symptoms and danger increased at monthly epochs.

2. *Heart, and other organs of circulation.*—Hypertrophy of heart, pericarditis, myocarditis, endocarditis, embolism.

Goître or bronchocele, exophthalmos.

Venectasis, varicose veins, hæmorrhoids.

Systemic arterial thrombosis, gangrene.

Pulmonary arterial thrombosis, and embolism.

Venous thrombosis, embolism.

Vulvar and vaginal thrombus.

Lungs.—Edema, dyspnœa, apoplexy.

3. *Hæmorrhages.*—From (*a*) mucous membranes; as uterine, vaginal, kidney, vesical, pulmonary, nasal, stomach, intestinal (sub-conjunctival).

(*b*) From skin; from rupture of varicose veins.

(*c*) From or into serous membranes; as peritoneum (mostly from Fallopian tubes or rupture of varix of broad ligament), into serous cavities of brain.

(*d*) Into parenchyma of organs; as cerebral and pulmonary apoplexy, or placental apoplexy.

Plethora, anæmia, progressive pernicious anæmia.

4. *Serous or watery discharges.*—From uterus, from alimentary canal.

5. *Disorders of alimentary canal.*—Salivation.

Vomiting, pyrosis, diarrhœa.

6. *Liver.*—Simple icterus, congestion, a form of fatty change (Tarnier).

Acute yellow atrophy, malignant jaundice. Cirrhosis.

Glycosuria; associated with changes in blood preparatory to formation of milk.

7. *Spleen*—enlargement of.

8. *Kidney*.—A form of fatty change, congestion, albuminuria, glycosuria, pyelitis.

9. *Bladder*.—Incontinence of urine ; congestion, cystitis, exfoliation of mucous membrane.

10. *Serous membranes and connective tissue*.—Serous effusions, dropsy, œdema.

Acute rheumatism.

11. *Skin*.—Herpes gestationis.

12. *Breasts*.—Inflammation, abscess.

B. *Pathological processes continued from the præ-gravid state, or grafted upon the gravid state.*

Physiological excesses may leave the organs affected by them in a damaged condition ; and the woman, when overtaken by a new gestation, will be weighted by the diseases thus acquired.

B. 1. The chief of these are—Hypertrophy of the heart, venectasis, goître, exophthalmos, asthma, and other chronic lung diseases, Bright's disease, enlargement of spleen.

Phthisis, how affected by gestation. These organic lesions are all liable to be severely aggravated in a subsequent gestation.

2. Original or acquired diatheses : struma, tuberculosis, syphilitic, rheumatic.

3. Neurotic ; as chorea, ague, epilepsy.

B. 2. *Diseases grafted upon the gravid state*.—The zymotic fevers : typhoid, typhus, variola, scarlatina, rubeola, erysipelas, cholera, yellow fever, diphtheria.

Pneumonia.

Complications, with tumours, uterine and other ; displacements of uterus, as retroversion, anteversion, prolapsus, abnormal gestations, ectopic or extra-uterine ; diseases of the uterus and ovum.

Rheumatism of the gravid uterus (E. Rigby ; Kiwisch denies it).

VII.

ABORTION.

Abortion is an accident of many of the diseases of gestation.

Three factors to be considered in the study of abortion :

- (1) The father ; (2) the embryo ; (3) the mother.

The mother's state is a complex state resuming all three, in those cases where the father is the subject of certain diseases.

Abortion may or may not be preceded by the death of the embryo.

Death of the embryo necessarily entails abortion.

Definitions.—Abortion means the arrest of gestation at a stage antecedent to the viability of the embryo.

Abortion is *complete* when embryo and membranes are expelled.

Abortion is *incomplete* when embryo is expelled, the membranes being retained.

Abortion is '*concealed*' when embryo has perished and the whole ovum is retained.

Abortion is the scientific equivalent of the vulgar *miscarriage*.

What constitutes '*criminal abortion*' ?

Premature labour distinguished from abortion by occurring after the embryo has attained viability, but is still immature.

'*Missed labour*' means the hypothetical retention of a mature fœtus in the uterus beyond the natural term of gestation, signs of labour at the proper time having been manifested. All the asserted cases are resolved into '*concealed abortions*' or '*ectopic gestations*.'

ANALYTICAL CLASSIFICATION OF CASES OF ABORTION.

1. Cases in which the determining cause lies in the mother.
2. Cases in which the determining cause lies in the father.
3. Cases in which the determining cause lies in the embryo.

Mother and fœtus may poison each other (Savory's experiments).

MATERNAL CAUSES.

A. 1. *Diathetic* :—As inherited syphilis, struma, tuberculosis. *Poisons in mother's blood*—Communicated: *heterogenetic*, as fevers, malaria, syphilis.

Gases—as CO_1 CO_2 .

Mineral—lead, copper, mercury, arsenic.

Vegetable—ergot, savin.

2. Products of morbid action; *autogenetic*, as in jaundice, albuminuria, glucosuria. CO_2 from asphyxia, as in the moribund.

3. Anæmia, from over-suckling, obstinate vomiting, Bright's disease, lithiasis, jaundice.

B. *Diseases disturbing circulation dynamically*.—Some liver diseases obstructing portal system.

Heart diseases, excess of vascular tension.

Lung diseases, thoracic and abdominal tumours.

C. *Causes acting through nervous system*.—Some neuroses.

Excess of nervous tension.

Shock, physical and psychical.

Diversion or exhaustion of nerve force, as from vomiting.

Vomiting, chorea, convulsions, apoplexy.

(These two last act partly through asphyxia, producing CO_2 in blood).

D. *Local or pelvic diseases*—of uterus, as inflammation, hypertrophy, tumours.

Diseases of decidua.

Mechanical anomalies, as flexions and versions of uterus. Fissures of cervix (Whitehead; Emmet). Pressure of tumours external to uterus, as ovarian, preventing its development. Adhesions binding uterus.

E. *Adolescent and climacteric abortion*.

f. Artificially caused by violence.—*Direct* : blows, squeezing, puncture of uterus.

Injury to ovum.

Indirect : as from violence remote from uterus ; shock.

FŒTAL CAUSES.

A. Diseases of ovum.—Primary or secondary upon diseases of maternal tissues or blood.

B. Diseases of embryo generally causing its premature death.—Faults of development ; some monstrosities.

Diseases of nervous system.

Diseases of kidney, liver.

Diseases, general, as syphilis.

Mechanical, or anything causing death of embryo, as torsion of the cord, strangulation of the cord, pressure from a twin fœtus.

Inflammation of serous membranes : peritonitis, pericarditis, pleuritis ; sclerema, ichthyosis, goitre, or bronchocele.

Diseases of the ovum, membranes, and placenta.

The membranes of placenta are compounded of *fœtal elements* and *maternal elements*.

Hence there are *diseases of the fœtal elements*, mostly derived from the fœtus and the father ; and *diseases of the maternal element*, mostly derived from the mother.

1. Diseases of the *fœtal element* ; *i.e.* of the amnion and chorion—congestion and inflammation.

Dropsy, hypertrophy, atrophy, cystic or hydatidiform degeneration, fatty degeneration (R. B.), calcareous degeneration, myxoma, tumours.

2. Diseases of *maternal element of placenta*.

Diseases of decidua not yet formed into placenta, inflammatory, syphilitic, strumous. Recurrent abortions presumptive evidence of syphilis.

Diseases of decidua when forming part of structure of

placenta: congestion, inflammation, abscess, apoplexy or hæmatoma, 'fleshy mole,' fibrinous effusions, induration, hypertrophy, atrophy, fatty, calcareous, and fibrous degenerations.

Distinction between fatty degeneration and fatty metamorphosis; fatty degeneration attacks living tissues, and is of pathological significance; fatty metamorphosis is a change in dead tissue.

Fleshy, fibrinous, fibrous tissue moles, distinguished from placental or true ovular moles.

THE PROCESS OF ABORTION.

Analogous to that of labour.

Three mechanical factors—(1) The body to be expelled, the ovum; (2) the expelling force, the body of the uterus; (3) the resisting force, the neck of the uterus.

Predisposing causes.—Exalted nervous irritability, favouring contraction of the muscular wall of the uterus and pain.

Exalted vascular tension, favouring hæmorrhage.

Determining causes.—All conditions which kill the embryo, or which cause effusion of blood into the decidua or placenta.

Exciting cause.—Reflex irritation from uterine contents, as from sudden distension by blood, generally taking place during exalted tension of ovulation: *i.e.* at a menstrual epoch.

Process of abortion when embryo perishes—(1) Arrest of development of uterus; (2) atrophy of vascular and membranous connections between uterus and ovum; (3) contraction of uterus.

The chief symptoms are pain and hæmorrhage; neither is constant.

Necessity of examination by vagina.

State of the uterus and vagina when abortion is impending.

Is abortion proceeding? Escape of liquor amnii; open cervix.

Can it be averted? Prophylaxis.

Treatment.—If abortion is proceeding: indications; to accelerate the process, to check hæmorrhage, and moderate pain. Medicines, use of; as ergot, opium, turpentine, chloral, chloroform, ether, nitrite of amyl, nitroglycerine, belladonna, digitalis; operations, dilatation of the cervix, removal of ovum.

Instruct to preserve all discharges.

Has an abortion taken place?—Only determined in affirmative by seeing elements of ovum.

If hæmorrhage: use of hot and cold water, ergotin, perchloride of iron, iodine.

Restorative treatment.

Consequences of abortion: generally similar to those of labour at term.

Physiological: involution and regular return to the ordinary conditions of non-pregnant state.

Pathological: the disorders of low nervous and vascular tension, being essentially connected with absorption and blood-contamination; subinvolution, etc.

Prophylaxis: special care at recurrence of monthly periods; chlorate of potash in syphilitic cases (Simpson), and iodine and mercury. Treat father as well as mother (Aix-les-Bains.)

NOTE.—The causes specified are rarely found acting singly. Several commonly act in concatenation.

VIII.

INDEX TO THE STUDY OF ANOMALOUS AND COMPLICATED GESTATION.

COMPLICATED GESTATIONS.

- A. Ectopic gestations=extra-uterine gestations.
- B. Gestation in one horn of a two-horned uterus, or other imperfectly developed uterus.

c. Uterine gestation complicated with tumours, uterine or extra-uterine, or other abnormal conditions.

d. Uterine gestation, with dislocation of the uterus.

e. Superfetation.

A. *Ectopic gestation*.—Definition. The term includes all gestations outside the cavity of the body of the uterus.

1. *Ovarian*.—Reality of this form contested.

Issues.—Early rupture; going on to term or beyond (v. 'Abdominal form').

2. *Tubal*.—Mostly in outer third of tube; seat of, Douglas' pouch. Symptoms: hæmorrhage, rupture of sac, 'abdominal collapse,' 'cataclysmic hæmatocele.' Diagnosis before and after rupture.

Issues.—Death rapid, recovery (v. 'Abdominal form').

Causes.—Inflammatory adhesions; obstruction of ostium uterinum of tube by tumours, etc.; hard work.

Corpus luteum occasionally found on opposite side.

Theories of extra-uterine and intra-uterine migration of ovum.

Rupture occurs at a menstrual epoch. Hæmorrhage; intra-peritoneal, and from uterus. Cause of hæmorrhage and of rupture; analogy with abortion.

Influence of tubal gestation upon the uterus; growth of decidua.

Treatment.—*Before rupture*: puncture of sac, injecting morphia or iodine; electricity to kill embryo.

After rupture: restoratives; question of laparotomy.

Tubo-ovarian.—May burst; may go to term; may merge into abdominal form.

Abdominal.—Theory of origin: generally resulting from tubo-ovarian. Issues: cyst may burst, the foetus dies; death of mother by exhaustion; peritonitis; fistulous communications form with intestines, bladder, or vagina; may go on to term; 'missed labour' necessary. The so-called 'lithopædion';

retention for an indefinite time. Diagnosis from ovarian tumours sometimes difficult. Symptoms.

Treatment.—Under early rupture, laparotomy? when growth of embryo is continuing, laparotomy or expectancy; when natural term of gestation is attained, laparotomy or expectancy until child is dead or vascular action has ceased. What to do with the placenta?

When the child is dead, immediate or deferred laparotomy. Aid when eliminative effort by disintegration of child is in progress. The operation of laparotomy. What to do with the placenta?

B. Varieties of abnormal development of uterus, as bifid uterus, unequal development of two sides. Interstitial, intramural, or 'parietal' gestation.

Gestation in one horn of a two-horned uterus; gestation in horn of a single-horned uterus; tubo-uterine gestation; difficulty of distinguishing from gestation in a rudimentary horn.

Course and terminations of interstitial gestations. Usually fatal by rupture of sac.

Hernial gestation.—Gravid uterus in hernial sac.

Sub-ectopic gestation.—1. Ovum growing in lower zone of uterine cavity below Bandl's ring, placenta prævia (R. B.).

2. Ovum developed in the canal of the cervix uteri (Chavanne).

Apparent gestations.—Dermoid cysts.

The '*fœtus in fœtū*.'

c. Uterine gestation may be complicated with—

1. An ectopic gestation, especially the abdominal kind.
2. Ovarian cystic tumour, or dermoid cyst.
3. Enlarged liver.
4. Cystic disease of kidney.
5. Pelvic hæmatocele.
6. Ascites.

IX.

ACCIDENTS OF GESTATION.

Dislocations of the gravid uterus.

General proposition.—In most cases the displacement existed at the time of conception. (Pelvic gestation).

Causes.—Prægravid retroversion, prolapsus, or retroflexion (Tyler Smith); a tumour in the posterior uterine wall; adhesions of uterus preventing its rise out of the pelvis; sudden violence, forcing the enlarged uterus backward and within the pelvic cavity; over-distension of the bladder (doubtful). Severe vomiting, or straining; an ovarian or other extra-uterine tumour preventing uterus from rising out of pelvis.

Retroversion is *complete* when whole uterus is locked in the pelvis; *incomplete* when part locked in pelvis, part growing into abdominal cavity.

Terminations.—(1) *Recovery* by reposition, spontaneous or surgical; (2) by partial outgrowth of the uterus into the abdominal cavity; (3) by abortion; (4) slow discharge of contents of uterus by fistulous communications with mucous canals (rare).

Death by (1) blood-poisoning, (urinæmic); (2) convulsions from induced Bright's disease; (3) shock and exhaustion; (4) rupture of bladder; (5) gangrene of uterus; (6) peritonitis.

Cystitis may end in exfoliation of the mucous coat of bladder, followed by death or recovery.

All the foregoing accidents result from eccentric pressure of the locked and growing uterus.

Diagnosis.—*In early stage*, whilst uterus is still movable.

1. *Subjective signs*, frequent micturition, partial retention; straining at stool and micturition, tenesmus. 2. *Objective signs*, uterus felt low in pelvis; os uteri pointing forwards, body backwards, the organ moving under pressure, capable of reduction.

Treatment.—Recumbent posture inclining forwards, care in keeping bladder and rectum empty; reposition of uterus; operation for reduction; adjustment of Hodge-pessary to keep uterus *in situ*.

When uterus is impacted in pelvis (incarceration).

Subjective signs urgent.—1. Pressure signs, pelvic and abdominal pain; real retention of urine, obscured by dribbling; shock, result of pain, and bladder and womb difficulty; reflex, as straining and forcing-down; secondary or constitutional, as urinæmia and exhaustion.

Objective signs.—Distension of abdomen from distended bladder, defined by percussion; finger in vagina is borne behind symphysis pubis to find the os uteri; upward dragging of urethra and meatus; bulging of anus and perinæum; the bladder emptied by catheter, the outline of uterus then defined by bimanual examination.

Retroflexion of gravid uterus.—Signs usually less marked than in pure retroversion. The os uteri is pointed downwards, cervix driven against symphysis pubis. The *objective* signs resemble those of retro-uterine hæmatocele, or small ovarian or ectopic gestation-cyst in Douglas' pouch, or retro-uterine abscess.

General fact aiding in diagnosis: all bodies which get into Douglas' pouch *come from above*, and so push the uterus forwards and downwards, bringing the os uteri low down. Retroversion and retroflexion carry the os high up.

Use of the sound in bladder in defining the position of the uterus.

Partial retroversion or retroflexion.—The uterus partly growing out into abdominal cavity; symptoms less urgent; may go to term—a form of dystocia (Oldham).

Treatment, applying generally to all preceding cases.—Rest; empty bladder, and bowel; under anæsthesia attempt reduction; the operation by hand, by elastic bags. Knee-elbow posture.

If attempt at reduction fail, and symptoms are urgent, induce abortion; use of aspirator, bulk of uterus lessened, reposition more easily effected. Secure *in situ* by Hodge-pessary.

After-treatment.—Watch the bladder; rest. Urinæmia may still be fatal after reposition.

Prophylactic treatment.—If a woman be suspected to have had prolapsus or retroversion in the prægravid state, keep the womb *in situ* by a Hodge-pessary during the first three months of gestation.

Prolapsus and procidentia of the gravid uterus may be continued from prægravid state, or may be produced as a hernia during gestation; rarely complete; sometimes apparent, there being really *hypertrophic elongation of the cervix*.

Anteversio of the gravid uterus.

Rare in such a degree as to cause urgent symptoms.

Anteflexion.—The body of the uterus hanging over the symphysis pubis, like a pack-saddle (the '*utérus en besace*').

Causes.—Prægravid anteflexion; relaxed abdominal walls.

Issues.—Mostly goes on to term, giving rise to a form of dystocia.

Treatment.—An abdominal belt.

These displacements all liable to recur after labour, premature or at term.

How to meet this liability.

X.

LABOUR: EUTOCIA.

Consists of—(1) Expulsion of fœtus; (2) of after-birth.

Labours are divided into (Depaul)—(1) *Spontaneous*; (2) *artificial*.

1. *Spontaneous* labours are *easy* (*eutocia*) or *laborious* (*dystocia*.)

2. *Artificial* are those which require the aid of art.

(The artificial labours all come under dystocia.)

Three factors (mechanical) in labour:—(1) The body to be expelled; (2) the expelling force; (3) the resisting force, compounded of tissues which have to be dilated, and of friction. The power, the passages, the passenger (the three P's, A. R. Simpson).

Three orders of phenomena observed:—(1) Physiological; (2) mechanical; (3) plastic.

Causes of labour.—*Determining causes*: maturity of ovum; changes going on in placental tissues; accumulation of carbonic acid in blood; softening of cervix, and pressure of ovum upon the lower segment of uterus, setting up diastaltic action; growth of muscular tissue of uterus, and increase of its irritability; intensification of nervous energy; ovarian stimulus.

Efficient causes: uterine contractions, abdominal contractions; voluntary effort.

PHYSIOLOGICAL PHENOMENA OF LABOUR.

Premonitory or precursory signs.—1. Dropping of womb into pelvic cavity.

2. Increased obstruction of venous circulation of lower extremities and genitals.

3. Mucous and slight blood discharge: 'the shew.'

Proper physiological signs.—1. Contractions; uterine, abdominal, vaginal.

2. Definition of a 'pain'; effect for cause. Pain is the measure of resistance to contraction.

Effects of contraction.—Uterus changes its form, becomes cylindrical if child is alive. Leroux's '*mouvement de ressort*' = Schatz's 'force of restitution of form.'

The uterus changes its position.

Characters of the uterine contractions (or pains).—Contractions are *general*, from above downwards ('*peristaltic*,' Tyler Smith); or from below upwards ('*anti-peristaltic*,' Spiegelberg).

Involuntary, but influenced by emotion.

Intermittent.

Duration variable; may become *tetanoid* and *permanent*.

Intensity varies with stage of labour, excessive or failing, 'inertia.'

Mechanical force. Experiments on membranes.

Effects of discharge of liquor amnii on pains.

The 'PAINS PROPER' differ in different stages of labour. During stage of *dilatation*, depressing, harassing; during *propulsion*, pains, but less exhausting; during *expulsion* attended by reflex bearing-down, extorting expressions of suffering; at moment of passage of head, crushing, momentary delirium; closure of glottis and opening.

The seat of the pain varies; it is generally in the structures immediately resisting labour.

Pains are *false*, occurring before labour.

Pains are *true*, occurring during actual labour.

How distinguished?

Abdominal contractions. Secondary on uterine pains, partly reflex, partly voluntary.

Vaginal contractions. Mostly observed in placental stage; muscular and elastic.

Dilatation of the os uteri.

How effected?

Factors.—Uterine action; distension by bag of membranes; by fœtus.

Dilatability; *contraction*; rigidity; occlusion.

The bag of membranes.—Tension during uterine contraction, flaccidity in intervals.

Shape significant of presenting part of child. Sometimes two or more bags rupturing successively.

May be *dense*, *tough*, or *slight*. Resisting force.

Escape of waters.—Significance of gradual and intermittent, and of sudden and rapid.

Transudation through membranes before rupture.

Four *functions of liquor amnii*:—(1) To save child from compression; (2) to save placenta and cord from compression; (3) to dilate cervix uteri; (4) it helps to lubricate passages.

The liquor amnii is to the fœtus what air is to the air-breathing animal, or water to the fish, as a medium, *quoad* its mechanical properties.

Seat of rupture: at part protruding through os.

Value of observing this in determining seat of placenta.

Effect of *bursting prematurely*.

Sometimes do not rupture; ovum then expelled entire.

Characters of liquor amnii.—Quantity, significance of; when tinged with meconium.

OPENING UP OF VAGINA, PERINÆUM, AND VULVA.

At end of gestation, head entering pelvis, shortens *vagina*, which forms a circular fold.

Retropulsion of coccyx: *bulging of perinæum*.

Descent of cervix uteri; anterior or uterine valve, posterior or perinæal valve (R. B.).

Opening of vulva.—Danger of laceration, contusion, thrombus.

THE EXTRUSION OF THE PLACENTA, OR THE THIRD STAGE OF LABOUR.

(*Supplementary Stage of Tyler Smith.*)

Placenta, how detached and cast out.

(1) The 'inverted umbrella'; (2) sliding down edgewise.

Contractions of uterus after expulsion of placenta.—Uses of:—

To secure against hæmorrhage.

To divert current of blood from pelvic vascular system.

To obviate septicæmia.

Areas of placental and of uterine placental surfaces, placenta in situ; and of uterine placental surface after placenta is cast.

Duration of labour.—Variable; average in primiparæ 12-15 hours; in pluriparæ, 7-8 hours. Point of departure, commencing dilatation of os uteri.

DIAGNOSIS OF LABOUR.

Not always easy.

Labour cannot be affirmed unless :—

1. Contractions painful, persistent, and more and more quickly following; and
2. The cervix is obliterated, and the os externum dilating.

WHAT TO OBSERVE IN THE PARTURIENT WOMAN.

1. The aspect and general condition.
2. Pulse, respiration, temperature.
3. Feel the abdomen, to estimate size, firmness, movements of uterus, position of uterus: also the changes in these conditions during the pains.
4. Inquire as to pains, their seat, order of recurrence, duration, intervals. Note the discharges, mucous, blood, watery.
5. *Vaginal examination.*—Lubricate the fingers with carbolic vaseline, 1 in 20.
6. The condition of bladder and rectum.

The first thing to determine is the reality of pregnancy; the next is the reality of labour.

Note the time of beginning of opening of os uteri. This marks beginning of *first stage of labour*. These points settled in the affirmative, the finger takes note of the condition of the vulva; of the vagina as to lubrication, dilatability; of the os uteri, its position; is it open—if so, to what degree? is it dilat-able? does it alter during a pain?

The presentation—this should, if possible, be made out; the bag of membranes; does it bulge during the pains? is it thick, resisting, or thin? is it still entire or burst? Catch the liquor

amnii in a bowl—inspect it; is it limpid, turbid, pale, or discoloured? Note the quantity.

Stethoscopic observation may be applied to the fœtal heart.

Note the time at which the membranes rupture. This marks the beginning of the *second stage of labour*.

Observation is now directed to the advance of the presenting part; the rotation and other adaptive movements.

The formation of the caput succedaneum or corresponding swellings in presentation of parts other than the head.

Note the condition of the woman as affected by the labour: pulse, respiration, state of skin, rigors, injection of face, or pallor? vomiting? defæcation?

Note the capping of the child's head: (1) by the uterine valve; (2) by the perinæal valve; the condition of the vulva and perinæum; the rotation and extension of the presenting part. When head is born, feel round neck for cord.

Support the perinæum.

Observe the evolution of the child during its birth.

Note the state of the child when born: sex, development, alive or dead; feel the cord, feel the thorax for heart-beat; observe aspect of face, cyanosed or pale; are limbs limp or flexed upon trunk? Respirations, character of.

The *plastic deformations*—i.e. shape of head; are cranial bones entire?

The third stage.—The cord is tied; the proper time for tying it.

Feel above pubes, state of uterus, and contractions.

Ascertain state of bladder.

Trace cord into vagina to ascertain if its insertion is within reach.

Observe state of woman: pulse, respirations.

Flow from vagina, hæmorrhage.

Trace state of uterus after expulsion of placenta; is there a second child?

The placenta is cast out or expressed.

Examine placenta minutely. Is it entire as to its cotyledons and membranes; observe relation of rent in membranes to nearest margin of placenta; how did placenta pass out of vulva—edgewise, or like a reversed umbrella, membranes covering maternal surface? Does it show signs of disease, fatty, calcareous, or other tissue change? Form; relation of insertion of cord to placental circle; is placenta single, diffuse, or does it show stray cotyledons?

Examine vulva and perinæum; intact or torn, extent of injury; thrombus.

The parturient becomes a puerpera. The binder is applied.

MECHANICAL PHENOMENA.

Definitions.—*Presentation*: the part of the child which presents at the os uteri.

Position: the relation of the presenting part to the pelvis.

Vertex: the summit of head; space between fontanelles and parietal protuberances.

DIAGNOSIS OF PRESENTATIONS AND POSITIONS.

A. HEAD.—*Vertex*. Recognised by firm expanse of bones, by sutures, and fontanelles.

Two occipito-anterior positions.—1. Right occipito-iliac anterior position; posterior fontanelle to left and forward.

2. Left occipito-iliac anterior position; posterior fontanelle to right and forward.

Two occipito-posterior positions.—3. Right occipito-iliac posterior position; posterior fontanelle to right and behind.

4. Left occipito-iliac posterior position; posterior fontanelle to left and behind.

B. FACE.—Generally high up at beginning of labour; not so easy to reach as vertex; recognised by nose, lips, jaws, chin.

Two mento-anterior positions.—1. Right anterior mento-iliac; chin to left and forward.

2. Left anterior mento-iliac ; chin to right and forward.

Two mento-posterior positions.—1. Right posterior mento-iliac ; chin to right and behind.

2. Left posterior mento-iliac ; chin to left and behind.

PELVIC EXTREMITY.

Breech.—Recognised by anus, genitals, sacrum, and coccyx, and tuberosities of ischia.

Two positions enough to recognise for clinical purposes.—

1. Dorso-anterior ; sacrum and coccyx forward.

2. Abdomino-anterior ; sacrum and coccyx behind.

With either position, *legs may be flexed or extended* ; recognised by passing hand into uterus.

Knees.—Recognised by two hard rounded tumours ; a modification of breech.

Like it, *two positions.*—1. Dorso-anterior.

2. Abdomino-anterior.

Feet.—Modification of knee or breech.

TRUNK.

Diagnosis.—Uterus widened transversely at commencement, presenting part high up ; a small member felt ; when membranes have burst, shoulder or arm or cord comes down.

Two orders of positions :

A. Dorso-anterior.—(1) Right arm to left ; (2) left arm to right.

B. Abdomino-anterior.—(1) Right arm to right ; (2) left arm to left.

Positions diagnosed by tracing anterior or palmar aspect of hand and arm to anterior aspect of body ; or *vice versa*, back of hand to back of body.

In all positions of head, breech, or trunk, there is a disposition for occiput or back to come forward towards end of propulsive stage.

COMPLICATED PRESENTATIONS.

Presentation or prolapsus of cord.

Presentation of placenta.

Presentation of uterine tumour or polypus.

DIMENSIONS OF PELVIS AND FETAL SKULL, AND THEIR
OBSTETRIC RELATIONS.

*Adaptations of skull modified by moulding to successive
planes of pelvis. Scale: inches.*

Pelvis.		Skull.
At brim—		
conj. 4·25-4·50	corresponds to	bi-parietal 3·75
transv. 5·00-5·25	„	{ occipito-frontal, 4·50, and sub-occip. bregm. 3·75-4·00
obliq. 4·75-5·00	„	
In cavity—		
conj. 4·75-5·00	„	bi-parietal, 3·75-3·50
transv. 4-75	{	{ occipito-frontal, 4·50-4·75, and sub-occip. breg. 3·75-4·00
obliq. 4·75-5·25		
At outlet—		
conj. 4·25-5·25	„	{ occipito-frontal, 4·75-5·00, and sub. occ.-bregm. 3·75-4·00
transv. 4·25	„	
obliq. 4·25-4·50	„	{ bi-parietal, 3·50 merging into bi-temporal, 3·25-3·00

Notes in appreciation of table.—1. At the outlet the pelvic conjugate is lengthened by retropulsion of coccyx; and mento-occipital diameter of skull is lengthened by moulding.

2. The correspondences of fetal and pelvic diameters are approximate only. Under the helicine progression the relations undergo gradual changes.

3. The long diameters of head are never in direct correspondence to pelvic diameters or planes. The flexion of head brings its long diameter to an angle with the pelvic planes; the head enters and traverses pelvis somewhat axially—that is, its long diameter approaches coincidence with the pelvic axis.

(The *circumferences* of head and pelvic canal should be studied.)

MECHANISM OF LABOUR.

Vertex presenting.—Six stages: (1) flexion; (2) engagement or descent in pelvis; (3) rotation; (4) disengagement or extension; (5) rotation of shoulders with restitution of head; (6) expulsion of trunk. (Tarnier.)

Four first stages apply to head, two last to trunk.

1. *Flexion*, chin flexed upon chest.
2. *Descent* of head in axis of brim; *synclitism*.
3. *Rotation*, occiput coming forward as head descends near floor of pelvis.
4. *Extension, progression, and liberation*, movement round symphysis pubis in Carus' curve or axis of pelvis.
5. *Interior rotation of shoulders and trunk, exterior rotation of head, restitution*.
6. *Liberation of the trunk*, progression of shoulders and trunk in Carus' curve.

Unuer Pajot's law of accommodation, presenting part undergoes successive *changes of shape and position*, or relation to the pelvic canal.

Dilatation of cervix uteri. 'Canalisation' of parturient passages.

During second, third, and fourth stages, head undergoes moulding in adaptation to pelvic and utero-vaginal canals.

There is a definite position of head for each plane of the pelvis. The head follows a screw or helicine movement.

Stretching of floor of pelvis. Dilatation of vulva.

FACE.

A. *Mento-anterior positions*.—First stage : *extension of head*, occiput fixed, face descending.

2. *Engagement or descent of head into pelvis.*
3. *Rotation of head*, chin coming forwards.
4. *Disengagement or liberation of head.*
5. *Interior rotation of trunk.*
6. *Expulsion of the trunk.*

B. *Mento-posterior positions*.—1. *Extension of head.*

2. *Engagement or descent of head into pelvis.*
3. *Rotation of head*—(1) chin coming forward ; (2) chin moving more backwards.

4. *Disengagement or liberation of head*—(1) chin under pubis ; (2) chin under coccyx.

5. *Interior rotation of trunk.*
6. *Expulsion of trunk.*

During second, third, and fourth stages of A and B head undergoes moulding in adaptation to pelvic and utero-vaginal canals.

BREECH.

1. '*Balling*' or moulding of breech.
2. *Engagement and descent of breech* ; lateral or sigmoid flexion of trunk.
3. *Rotation of breech.*
4. *Disengagement of breech.*
5. *Interior rotation of head.*
6. *Expulsion of head.*

TRUNK.

Spontaneous evolution (so-called Douglas').—Child dead or very small : a factor is easy plasticity of trunk=lost resiliency.

1. *Balling or concentric compression of trunk.*
2. *Engagement and descent of trunk.*
3. *Rotation of trunk.*
4. *Disengagement or liberation of trunk.*
5. *Interior rotation of head.*
6. *Expulsion of head.*

A. *By Breech.*—*Spontaneous version* (Denman).—Child probably living; a factor is resiliency of spinal column.

1. *Lateral descent of breech, simultaneous deflexion of presenting shoulder to opposite iliac fossa.*
2. *Lateral flexion of head.*
3. *Rotation of trunk, head rising, breech descending.*
4. *Engagement of breech.*

Further stages as in original breech presentation.

B. *Head or cephalic version.*—Child probably living: a factor is resiliency of spinal column.

1. *Rectification of head* in correspondence with axis of trunk.
2. *Restoration of cranium* to pelvic brim by lateral movement; breech rising to median line.

From this stage it is a vertex presentation, and follows the law of that presentation.

The mechanism of labour follows same law in all presentations and positions.

In all labours arrest of child, uterine contraction persisting, entails '*balling*' of child = *involution*; onward movement is attended by '*unballing*,' or *evolution*.

THE PLASTIC PHENOMENA OF LABOUR.

Deformations of the foetal head (moulding).

These affect (1) *the cranial bones*; and (2) *the scalp and the soft tissues* of the face.

Result of necessity of accommodation of head to pelvic and utero-vaginal canals in its transit.

Cranial deformation (caput succedaneum).—Sero-sanguineous swelling found in scalp over that part of cranium presenting through os uteri and vulva.

How produced.—The caput succedaneum and equivalent swelling of face, breech, and arm, proceed from constriction or strangulation of the part presenting, by the ring of the os uteri or of vulva. Hence, effusions of serum and blood in connective tissue.

Appearance after birth.—Prominent tumour of soft parts, of deep red colour.

Seat varies according to position of head. Thus :—

1. In right occipito-iliac anterior position, caput succedaneum forms primarily over right parietal bone near posterior fontanelle; secondarily, over adjacent occipital bone.

2. In left occipito-iliac anterior position caput succedaneum forms over left parietal and occiput.

3. In right occipito-iliac posterior position it forms over left parietal and left frontal bones.

4. In left occipito-iliac posterior position it forms over right parietal and right frontal bones.

In face presentations.—In *mento-anterior positions* the swelling forms on mouth, foremost cheek, eye, and brow.

In *mento-posterior positions* it forms more on eyes and forehead, but mouth is also involved.

In trunk presentation.—The presenting shoulder and pro-lapsed arm are enormously swollen and congested.

In breech.—The genitals are the seat of swelling; the side that is anterior showing most.

Significance of sero-sanguineous swelling, as observed after child's birth.

1. It indicates that child was alive during propulsion stage.
2. It indicates the presentation and position of child during labour.

Disappearance of the swelling in a few days.

ABNORMAL EXTRAVASATION-SWELLINGS.

Cephalhæmatoma.—Extravasation of blood between dura mater and cranial bones.

DEFORMATIONS OF TRUNK.

The principal is the balling or doubling-up of the trunk under uterine compression in shoulder presentations.

DEFORMATIONS OF CRANIUM UNDER LABOUR.

Original form of head.—Nearly spherical.

A special form is imparted to head in each presentation.

Vertex.—1. *Occipito-anterior positions*: Head elongated in occipito-mental diameter, shortened in transverse diameter, shape conico-cylindrical, asymmetry of two sides; lateral distortion.

2. *Occipito-posterior positions*.—Forehead and vault flattened, occiput elongated.

Face.—*Dolicocephalic*: Cranium elongated behind, and flattened vertically, occiput forced back, depressed near greater fontanelle.

In the frontal variety the forehead is greatly projecting.

Breech and Trunk.—In head-last labours, if easy, the cranium is nearly spherical at birth, or brachycephalous. The occiput is slightly driven forward.

In *difficult labours*, the head being oversized, or pelvis undersized or deformed, special deformations are produced.

XI.

HÆMORRHAGE.

Classification.—A. Hæmorrhages of
Pregnancy. } Hæmorrhages of high
B. Hæmorrhages of } tension.
Labour. }
C. Hæmorrhages after labour—hæmorrhages of
low tension.

A. HÆMORRHAGES DURING PREGNANCY.

General disposing causes.—High nervous and vascular tension; hydræmia; stimulus of ovulation.

a. Hæmorrhages not necessarily interrupting gestation.—During first trimestrium; from cervix uteri; from decidual cavity.

These simulate menstruation.

b. Hæmorrhage of abortion.—1. Blood extravasated breaking utero-placental connections.

2. From diseases of ovum, as hydatidiform degeneration of placenta.

c. Hæmorrhage from placenta prævia.—So-called ‘unavoidable.’ Placenta or portion of it grows in the lower segment of the uterus.

1. *Partial.*—Placenta growing down to near os uteri internum on one side.

2. *Complete.*—Placenta in great part occupying lower zone of uterus, and covering os uteri internum: *placenta centralis*.

Division of uterus into three zones.—(1) *Fundal*, or region of normal placental attachment; (2) *equatorial*, region of safe attachment; (3) *lower polar*, or region of dangerous attachment, *placenta prævia*.

Physiological boundary-line between safe and dangerous placental attachment is the line dividing lower polar from

equatorial zone; this is marked by Bandl's ring. How this line is determined and proved.

Theories of causes of hæmorrhage.—1. As gestation advances, lower segment of uterus expands, and detaches itself from placenta.

2. Barnes' theory : ovum growing outstrips the growth of the connected part of the uterus, and ovarian stimulus increasing vascular tension, disruption of utero-placental vessels occurs.

Theories of source of blood.—1. From detached portion of placenta (Hamilton, Kinder Wood, Radford, J. Y. Simpson). Considerations which disprove this theory.

2. *From bared surface of uterus*, proofs of.—Mackenzie's experiments. Clinical observations.

Course and symptoms.—Hæmorrhage occurring during second and third trimestria, generally at menstrual epochs. Sometimes not interrupting gestation. More frequently ending in premature labour.

Diagnosis.—Sudden rapid bleeding of arterial character, perhaps without pain, occurring apparently during systole of uterus, really during diastole; os externum sometimes not dilated or easily dilatable. Error of dictum that cervix is easily dilatable. Cervix uteri felt tumid, large; finger passed up cervix may feel the boggy, spongy placenta over os internum.

Prognosis and issues. Abortion; death of fœtus, death of mother—(a) from hæmorrhage and shock, (b) from septicæmia favoured by loss of blood and injury to the cervix uteri. Birth by spontaneous labour with safety to mother and child, or of one of them. Spontaneous arrest of hæmorrhage.

Treatment.—1. The old method by *accouchement forcé*; turning, objections to; the immature uterus not favourable to rapid or forced dilatation by hand. Use of plugging.

2. Total detachment of placenta (Simpson), dangers of. Laceration and bruising of cervix; necessary loss of child.

3. Rupture of membranes; when indicated.

4. Barnes' method: combination of rupture of membranes and use of binder, with artificial detachment of placenta from lower zone; artificial dilatation of cervix by Barnes' bags, bipolar turning of child, or forceps if bleeding continues. Remove placenta by expression, or by direct detachment.

Two orders of cases.—1. In which there is active contractile power of uterus with spontaneous dilatation. These may be treated by simple rupture of membranes, proceeding to other measures if hæmorrhage not arrested.

2. Cases in which contractile power is wanting. These generally require artificial delivery.

Summary of physiological propositions in reference to placenta prævia.—1. There is a stage when the flooding may be spontaneously arrested.

2. This physiological arrest depends upon active or tonic contraction of the uterus taking place when that portion of the placenta which had adhered within the lower zone (below Bandl's ring) is effected.

3. When this detachment is effected and contraction is present there is no physiological reason why further detachment and hæmorrhage should take place. The conditions are reduced to those of normal labour.

4. Attachment of placenta to lower segment of uterus is a frequent cause of transverse presentation (Levret).

5. In placenta prævia the cord frequently springs from lower edge of placenta (Levret).

6. Adhesion of placenta over os internum impedes the dilatation of this part.

7. Placenta is commonly attached to fundal and equatorial zones to avoid injury to lower zone, highly vascularised when placenta is attached in this zone, by the violence of labour.

Therapeutical corollary.—To detach placenta from lower zone.

d. 'Accidental hæmorrhage.' — *Definition* : hæmorrhage during pregnancy from detachment of placenta which had grown within the fundal and equatorial zones.

Objections to term 'accidental' as distinguished from 'unavoidable.'

Usually occurs during third trimestrium.

Causes.—Immediate : (1) Contractions of uterus breaking utero-placental connections ; (2) undue sudden determination of blood to uterus ; (3) external violence.

Predisposing : (1) Weak fibre, as in pluriparæ and women exhausted by disease and malnutrition ; (2) altered conditions of blood, as leucocythemia, variola, typhoid ; (3) fatty degeneration of heart ; (4) disease of placenta, especially fatty degeneration ; (5) Bright's disease.

Course and symptoms.—Two classes of cases. 1. Symptoms comparatively slight. Some hæmorrhage escapes externally ; pain and shock moderate. In some of these cases the placenta dips within the lower zone of uterus.

2. Cases marked by slight or no escape of blood externally, with intense pain, shock, and collapse. In these the detachment of the placenta is central ; the blood is imprisoned ; uterus stretched ; its form is distorted ; excessive tenderness to touch ; 'concealed hæmorrhage' (Braxton Hicks). Uterine contraction often arrested. The discharge often watery or serous ; the crassamentum being retained, serum is squeezed out. This is diagnostic.

Issue often fatal from hæmorrhage and shock. Child commonly killed by arrest of utero-placental circulation.

Treatment.—1. To relieve tension of uterus, rupture membranes.

2. Restoratives, stimulants, subcutaneous injection of one drachm of ether.

3. To accelerate delivery; the binder or manual expression, dilate cervix by bags; turning, forceps or craniotomy, remove placenta.

4. To arrest hæmorrhage, compression of uterus; if inert, swab interior with solution of perchloride of iron.

B. HÆMORRHAGE DURING LABOUR.

Hæmorrhages after birth of child.

1. Cases in which placenta is retained.

2. Cases in which hæmorrhage persists after removal of placenta.

1. *Placenta retained*.—Consequences of placental retention. Hæmorrhage and spasmodic pain; expulsion after hours or days; decomposition of its structure and of retained blood in utero; physometra; septicæmia; metritis, peritonitis.

Causes.—1. Inertia uteri. 2. Perverted uterine action from hurried delivery of child, or attempts to pull away placenta. Tetanus uteri. 3. Ergot given before expulsion of placenta. 4. Encysted or incarcerated placenta; 'hour-glass contraction.' 5. Adhesions of placenta, partial or complete."

Treatment.—1. *Retention of placenta from inertia*. Stimulants; friction or compression of uterus to squeeze out placenta. When placenta is expelled, compress uterus to ensure firm contraction, and give ergot—not before.

2. *Retention with tetanic or ergotic contraction of uterus*.—Opium, chloral, or inhalation of a few minims of nitrite of amyl. When spasm relaxes, remove placenta by passing in hand.

3. *Retention from adhesions*.—Common with the unskilled, rare with the skilled. May be suspected if placenta cannot be squeezed out, and if insertion of cord not readily felt. Introduce hand, peel off placenta by insinuating fingers between it and uterus.

C. HÆMORRHAGE AFTER REMOVAL OF PLACENTA.

Post-partum or puerperal hæmorrhage.—There is a *physiological hæmorrhage* consisting in discharge of superfluous blood from uterine vessels on expulsion of placenta. Analogous to menstruation. Serves to reduce vascular tension.

Hæmorrhages beyond this physiological degree are pathological.

Classification.—1st, Primary or immediate, and paulo-post; 2nd, secondary.

Sources of bleeding.—Gaping vessels on placental side. Lesion of cervix uteri or other part of uterus. How distinguished.

Course and symptoms.—(1) Rapid discharge of blood, dark or bright; (2) lax uterus, of irregular shape, large size, tender to touch; (3) irregular spasmodic contraction; (4) when uterus remains large, the flow often serous from compression of retained blood.

General signs and effects.—(1) Hæmorrhage disturbs relation between circulatory and respiratory systems; (2) promotes influx of blood into venous system from all parts of body; (3) promotes separation of fibrin; (4) syncope; (5) convulsions; (6) fall of temperature.

Patient conscious of loss; deafness, loss of sight, delirium, quickened suspirious respiration, disposition to vomit. Possible quick death from hæmorrhage; more remote danger of septicæmia, phlegmasia dolens, thrombosis, embolism.

Causes of hæmorrhage.—A. *Predisposing*: hæmorrhagic diathesis; the watery blood of pregnancy; heart disease; Bright's disease; original feeble muscular power; excessive cultivation of emotional and cerebral nervous functions.

B. *Immediate causes*: disturbed course of labour, protracted labour causing irregular contraction of uterus, or exhaustion inducing paralysis, inertia; retroflexion or ante-

flexion of uterus. Tumours in uterine walls impeding due contraction.

Nature's means of arresting hæmorrhage.—1. Regular tonic contraction of uterus, closing vessels and diverting blood-current from uterus.

2. Coagulation of blood in uterine vessels.
3. Lowering of heart-impulse.
4. Retraction of arteries.

Three degrees of hæmorrhage marked by physiological phenomena :—

1. Full retention of diastaltic function.
2. Considerable diminution of diastaltic activity.
3. Suspension or extinction of diastaltic function. Danger rises in order of these degrees. If hæmorrhage not checked, first degree merges into second, and second into third.

Treatment must be directed by the physiological conditions present.

Thus *in first degree* appeal to diastaltic function. Pass the catheter in all cases. To create contraction of uterus, empty uterus by compression ; cold, externally and in uterus. Heat by hot-water injections ; compression of aorta. Faradisation.

Steady heart's action and promote nerve-power, by digitalis, quinine, ergot. Ergotine may be injected subcutaneously. Uses of opium.

In second degree.—Restoratives, stimulants to rouse nervous force ; compression of uterus ; hot-water injections. Opium. Faradisation.

In third degree.—Still compression of uterus ; agents that evoke diastaltic action now useless or injurious. The inner coat of uterus may still be contracted and blood coagulated in open vessels by astringents. If depression is great, first restore by subcutaneous injection of ether ; warmth to surface ; economise blood by keeping head low, legs and pelvis high ; constringe inner surface of uterus, previously emptied by the hand,

by slow injection of perchloride of iron—one part of solid perchloride dissolved in ten parts of water. Use of iodine and other styptics.

Dangers attending iron injections.—The same as those of hæmorrhage, viz. shock, septicæmia, phlegmasia dolens. These last three are lessened by intra-uterine washings with carbolic acid, 1 in 60. Entry of air into uterine sinuses; driving of iron solution through Fallopian tubes. Thrombosis.

In extreme losses, *transfusion* of whole or defibrinated blood, or saline solutions.

Prophylactic treatment of subjects prone to hæmorrhage.—Care during pregnancy to increase nervous and muscular force; to improve blood by iron; to regulate secretions.

Secondary or restorative treatment.—Digitalis, salines; nutritive food by mouth or enema; later, quinine and iron. Rest.

1. *The paulo-post partum hæmorrhage.*—Arising within a few hours, from relaxation of uterus; from retention of clot in uterus; from retro-flexion of uterus.

Treatment on principles of primary hæmorrhage.

2. *The secondary or puerperal hæmorrhage.*—Arising days after labour. Causes: (1) a bit of placenta or membranes retained; (2) clots in utero; (3) laceration or abrasion of cervix, vagina, or perinæum; (4) thrombus; (5) chronic hypertrophy or ulceration of cervix; (6) general relaxation of uterine tissue; (7) fibroid tumours or polypi; (8) inversion of uterus; (9) retroflexion or antelexion of uterus; (10) pelvic cellulitis or peritonitis fixing uterus; (11) emotions; (12) sexual intercourse; (13) returning ovarian stimulus, commonly at end of month from labour; (14) heart diseases, including imperfect involution of heart and uterus; (15) liver disease; (16) Bright's disease.

Issues.—Disposes to anæmia, exhaustion, thrombosis, phytometra, septicæmia.

Treatment.—Removal of causes; empty uterus; restore normal position of uterus; if contraction cannot be induced, inject hot water and iron solution, wash out uterus with carbolic acid 1 in 60. Restoration as in primary hæmorrhage.

XII.

ACCIDENTS ARISING DURING AND FOLLOWING
UPON LABOUR.

- A. Hæmorrhage; thrombus or hæmatoma.
- B. Lesions of the parturient canal: ruptures, lacerations, bruising of uterus, vagina, perinæum; sloughing.
- C. Fistulæ; vesico-vaginal, recto-vaginal.
- D. Inversion; retroflexion, antelexion.
- E. Inflammation and loosening of pubic symphysis.
- F. Subinvolution.
- G. Nervous disorders.
- H. Disorders of circulation and lungs.

A. THROMBUS OR HÆMATOMA.

Definition.—A blood-effusion under the mucous membrane of some part of the parturient canal. It forms a chapter in 'Hæmorrhage.'

May form *before* delivery of child; more frequently *after*.

Causes.—*Predisposing*: the varicose state of the blood-vessels; *immediate*: arrest of circulation under pressure of child's head above the seat of effusion; friction; mucous membrane carried down in 'glacier-movement' by head, tearing vessels in connective tissue.

Seats.—(1) Peri-uterine in cellular tissue between cervix uteri and bladder, and running up broad ligament from os uteri; (2) in vaginal-portion; (3) in vagina; (4) in vulva, especially in labia majora.

Issues.—(1) May burst and bleed dangerously; (2) may be absorbed; (3) may suppurate, entailing risk of septicæmia;

(4) gangrene. Death may ensue from any of above causes except (2).

Diagnosis.—The fluctuating swelling; acute pain marks formation.

Treatment.—Open the tumour: compress with lint soaked in perchloride of iron or in weak carbolic acid; wash out cavity.

B. LESIONS OF THE PARTURIENT CANAL.

Uterus.—1. Rupture or bursting. 2. Laceration. 3. Grinding or crushing. 4. Perforation. 5. Avulsion or tearing away.

Definitions.—1. *Rupture or bursting.*—Under strong tension of uterus upon its contents, its walls burst more or less suddenly, in the body or cervix.

2. *Laceration or rent.*—A breach begins at edge of os uteri and extends.

3. *Grinding or crushing*, as when uterus is subjected to long compression between child's head and the pelvic wall. This generally takes place in a circular direction in the lower segment.

4. *Perforation or boring through.*—When tissues give way from disease, or long compression at one point, or from penetration by a spike of bone or instruments.

5. *Avulsion.*—The uterus has been torn away by manual force.

Uterus may rupture at any time during gestation, more commonly in labour at term.

Ruptures are (1) spontaneous, or (2) traumatic.

Causes.—*Immediate*: (1) Concentric contraction of uterus upon its contents, which cannot escape by natural channels; (2) contraction of uterus whilst lower segment is fixed against pelvic brim; (3) contraction of uterus upon projecting limb of child; (4) perforation from jagged bone of child or spiculum of pelvic bone; (5) sudden violent effort.

Disposing causes.—Disease of uterine tissue; fibrous tumours, cancer, fatty or fibrous degeneration, softening, necrosis from friction. The healthy uterus may rupture itself.

Seat of rupture.—1. In fundus and body, transverse or longitudinal. 2. In lower segment or cervix, circular or transverse, if result of drag of uterus fixed at pelvic brim; longitudinal, if extended from laceration of cervix at os. These more frequent at left side.

Rupture may involve all the tissues of uterus: *complete*; or mucous membrane, and muscular wall, or peritoneal coat alone.

The circular rupture may be complete, separating uterus from vagina, so that it has been pulled away or expelled from the body.

3. Vagina, complete or incomplete, may be extensions from laceration of cervix.

4. Of perinæum and vulva.

Symptoms and course.—In *spontaneous rupture*: sudden acute pain, shock, collapse, sometimes external hæmorrhage. These not constant or immediate. Cessation of uterine contractions; arrest of labour. Sometimes fœtus and placenta cast out into abdominal cavity. Intestine may descend into uterus, vagina, and even show externally. Diagnosis between intestine and umbilical cord. Issues in death from (1) shock; (2) hæmorrhage; (3) metritis, gangrene, peritonitis; (4) thrombosis; (5) septicæmia; (6) ileus. But recovery in some cases, even after complete avulsion.

Treatment.—1. *Prophylactic.* Care in conduct of labour to obviate usual causes. 2. *Curative*: (a) when child is retained in utero, deliver by readiest methods; (b) when child is cast out into peritoneal cavity, laparotomy, to remove child, placenta, and clots—perhaps to remove uterus; (c) when intestine protrudes into vagina: gentle attempts at reduction. If not reduced, it may return spontaneously; it may be stran-

gulated. Laparotomy to restore intestine, and close uterine wound, or remove uterus by Porro's operation.

Treatment of simple laceration of the vaginal-portion of the cervix.—Emmet's operation.

Discussion of medico-legal relations.

C. VAGINAL INJURIES.

Vesico-vaginal fistulæ.—Generally result of sloughing from compression of soft parts between child and symphysis pubis.

Treatment.—Plastic closure.

Recto-vaginal fistulæ rare, history similar.

Sloughing of cervix and vaginal walls, followed by cicatricial contraction of uterus and vagina; complete or incomplete.

Treatment during sloughing stage: disinfecting, swabbing, and dressing; after cicatricial contraction, dilatation by incisions and pessaries.

Lacerations of perinæum and vulva occur during passage of head and shoulders; with or without use of forceps.

Varieties.—1. Tearing or bursting, beginning at fourchette, extending to sphincter—*incomplete*; through sphincter—*complete*.

2. Perforation through centre of perinæum.

3. Laceration of anterior vulva.

Treatment.—1. *Prophylactic*: support perinæum. 2. *Curative*: immediate or deferred stitching up.

4. Laceration of mucous membrane, skin escaping.

D. INVERSION OF UTERUS.

Definition.—Turning inside out of uterus.

Three degrees (Crosse):—1. Depression; fundus or angle partly falling into cavity. 2. Introversion; fundus depressed and grasped by lower segment of uterus. 3. Perversion or *complete inversion*. 1 and 2 are *incomplete*.

Inversion is *acute or chronic*. Definition (R. B.): *acute* whilst involution is going on; *chronic* when involution complete.

Causes.—*Spontaneous*, or produced by *external violence*. Rare in modern practice. 1. It occurs during third stage of labour. 2. It has occurred after abortion. 3. Also in non-pregnant uterus holding a tumour or polypus.

Predisposing causes.—Relaxation of part or whole of uterus; hæmorrhage; paralysis of placental site, which, falling into cavity, may fall through the cervix, or being gripped by body of uterus is expelled through cervix like a tumour: *spontaneous passive inversion*, and *spontaneous active inversion* (John Hunter; Crosse; Tyler Smith; Rokitansky).

Extraneous causes.—1. Pulling upon cord whilst uterus is paralysed. 2. Expression of placenta (R. B.).

Symptoms and diagnosis.—Shock; hæmorrhage; woman's sense that something has 'come out'; retention of urine. The tumour formed of uterus and placenta, if this is still attached. Uterus recognised by its contractility. May be simulated by a polypus: polypus hard, not contractile. Inversion known by continuity of vaginal roof with root of tumour and by cup-like depression felt through abdominal wall. Sound in bladder may be met by finger in rectum above the tumour.

Terminations.—1. Rapid death from shock. 2. Death from shock and hæmorrhage. 3. Strangulation of uterus, secondary shock, sloughing. 4. Strangulation of intestine in inverted uterus. 5. Spontaneous restitution, doubtful in complete inversion. 6. Merges into chronic form, then tolerance, or exhaustion from hæmorrhagic and watery discharges.

Treatment.—When recent and placenta adhering: if uterus is flaccid, reduce *en masse*. If any resistance, peel off placenta first; then reduce uterus under nitrite of amyl or chloroform or chloral, returning that part first which came out last, meeting fundus by hand outside; direct the pressure to one side of promontory.

Reduction may be accomplished at any time.

In chronic form, reduce under chloroform, at one sitting, or

by sustained elastic pressure and taxis (Tyler Smith; Barnes; Aveling). If this fail, incise the constricting os uteri (Barnes).

Retroflexion and antelexion of uterus.

Causes.—Hæmorrhage, inertia or paralysis of uterus, pressure of intestines upon anterior or posterior walls of uterus; distended bladder throwing fundus back; growth of placenta to posterior or anterior wall near fundus (E. Martin). Retention of placenta or clots; predisposition from flexion in non-pregnant state. Kneading and compressing uterus back into pelvis.

Consequences.—In recent stage—hæmorrhage, pain from bearing-down and spasm of uterus, retention of urine.

In chronic stage—subinvolution, disordered menstruation, nervous symptoms.

Treatment of recent form: pass hand into uterus to remove clots or placenta; carry fundus forward; lateral or prone decubitus; a Hodge pessary. To cause contraction of uterus, quinia, strychnia, digitalis, ergot.

Retention of placenta, part or whole; or clot; decomposition; physometra.

Treatment.—Empty uterus; disinfectant irrigation; quinia and ergot.

DISORDERS OF CIRCULATION AND LUNGS.

Thrombosis and embolism, rare before or during labour; pulmonary apoplexy; emphysema of lungs (apt to follow use of ergot); entry of air into veins and heart through uterine sinuses; shock acting on diseased heart; rupture of heart; rupture of aneurism; rupture of varicocele of utero-ovarian plexuses.

SUDDEN DEATH.

Some of the accidents above specified may entail sudden death. Shock from pain or emotion, syncope, apoplexy; shock

acting on diseased heart; rupture of heart; pulmonary apoplexy; thrombosis and embolism; sinking from hæmorrhage; entry of air into vena cava and heart through uterine sinuses.

XIII.

THE NEW-BORN CHILD.

Changes in circulation consequent on substitution of lung for placental respiration.

OBLITERATION OF UMBILICAL VESSELS AND FALL OF CORD.

Retraction of arteries; clotting of blood in them; diversion of blood-current from them. Clotting in vein. Drying up of cord, fall, three to five days; cicatrisation, eight to ten days. Richet's '*anneau contractile*,' or sphincteric fibres round umbilicus.

Obliteration of umbilical vessels inside the abdomen.—The arteries retract towards the pubes, the vein towards the liver, forming fibrous filaments adhering to umbilical ring.

The foramen ovale, or of Botal.—Gradually closed by a valvular fold; often pervious to probe months after birth. Generally venous and arterial bloods run their due course, notwithstanding imperfect closure; but sometimes there is admixture: *cyanosis*.

Ductus arteriosus.—Obliteration, usually complete in twenty days; begins in middle.

Dilatation of vessels for definitive circulation.—Pulmonary artery and veins enlarge to carry blood which before birth passed through foramen ovale and ductus arteriosus.

Vena portæ enlarges.

Left ventricle thickens.

Pulse best felt at heart. Twice frequency of adult; slows

during sleep; becomes less frequent with advancing age. A *bruit de souffle* indicates persisting communication between the two sides of the heart.

The blood of the new-born.—Colour at first venous; fibrin less than in adult; *red globules* less regular; 'dwarf and giant globules' more numerous, some have nuclei; *white globules* smaller and more numerous; *haematoblasts* less numerous; but all elements undergo quick changes (Hayem).

Respiration.—Causes of first inspiration: reflex from excitation of respiratory nerve (Marshall Hall); excitation of medulla oblongata by blood, with excess of CO₂, consequent on suppression of placental circulation (Vierordt); expansion of air-vessels, the cry useful; sudden removal of pressure from chest on birth (R. B.); frequency.

Type is abdominal.

Temperature.—At birth 37°·25 C. (Roger); it is higher than that of mother's vagina, less than that of uterus (Parrot); it falls sensibly after birth. Calorification feeble; artificial heat important.

Digestion.—Digestive organs incomplete.

Suction: saliva and ptyaline scanty at first.

Stomach nearly straight and vertical; food quickly passes to intestine; is of small capacity. Milk is coagulated by gastric juice.

Intestine: pancreatic action; albuminoids dissolved; fat emulsion; bile copious; absorption in small intestine active, bile prevents putrefaction.

Evacuation.—Voiding meconium a respiratory act; lasts three to four days. Then residue of digestion; yellow, inodorous from bilirubine. If green, bad digestion. Acids: capric acid present; alkalis useful.

Urine.—Some always in bladder at birth unless voided under compression of hard labour. Voiding a respiratory

act. In first days, whilst new-born is losing weight, urine may be coloured, as in adult, but it soon becomes colourless. *Sp. gr.* 1,005 or 1,006; then 1,003 to 1,004.

Sediment: epithelium cells of urinary tract; crystals of uric acid; oxalate of lime; oxalate of soda.

Reaction: neutral, or faintly acid.

Urea: little at first, increasing with age.

Uric acid: present in suckling.

Uratic infarctus of kidneys: crystals of urate of ammonia (Virchow); urate of soda (Parrot); seen in sections as small yellow cylinders in urinary tubes. Result of athrepsia (Parrot).

Allantoin albumen traces immediately after birth, especially after difficult labour and respiratory trouble.

Salts: chlorides, phosphates, sulphates, very scanty.

Skin.—Changes of colour.—At first rosy; in eight days becoming paler; more persistent in premature child; evidence of trouble in circulation, sometimes give place to sub-icteric tinge; not true jaundice; it is result of transformation of colouring matter of blood; more frequent in delicate children; sometimes fatal. R. B. has known eight children of same parents die from this cause.

Nævi materni: some disappear in a few months.

Desquamation: second or third day, epithelial exfoliation; new epidermis.

Cutaneous excretion: perspiration at first none; sudorific glands slightly developed.

Lacteal secretion in new-born.—Mammary glands enlarge; milk oozes; 'Hexenmilch' or 'witches' milk'; sometimes mastitis, abscess; this commonly caused by manipulation to squeeze milk out.

Growth of child.—Loss of weight in two or three days; then gain.

Sutures and fontanelles: in healthy child these enlarge at first, and tend to contract and close towards end of first year; they contract in athrepsia.

Care of the new-born.—Cleansing; treatment of umbilical cord; question of putting to breast.

Care of eyes to anticipate ophthalmia.—Theories of production:—1. Contact of irritating matter in maternal passages during labour. Hence prophylactic idea of G. Müller, Credé and others to apply nitrate of silver to eyes in every case. 2. Contact with foul matter in water, sponges, cloths, or nurses' fingers, &c., in tending child. Ophthalmia seen in children removed by Cæsarian section, and born in intact membranes (R. B. and F. B.)

To obviate erysipelas of navel.—Same care.

ASPHYXIA NEO-NATORUM.

Three forms:—

A. *Simple asphyxia.*—*Definition*: the state arising from interrupted hæmotosis on arrest of placental respiration before establishment of lung-respiration.

B. *Paralytic asphyxia.*—*Definition*: prevented respiration from centric nervous incapacity.

C. *From imperfect development.*

A. *Simple Asphyxia.*—*Causes.*—1. *Before birth* or active labour: considerable or complete detachment of placenta; unintermittent uterine contraction, as from ergot; cyanosis or feeble hæmotosis of mother, from disease, hæmorrhage, or moribund state.

2. *During birth*: the above (in 1); compression of placenta; knotting of cord; twisting of cord round neck or body; compression of cord.

B. *Paralytic Asphyxia.*—*Causes*: compression or other injury to brain and medulla oblongata.

Symptoms and diagnosis of A.—Cyanosis of face and skin generally; twitching of limbs in inspiratory efforts; sucking in of circumambient fluids; flagging of heart's action; perhaps

evacuation of meconium and urine. If respiration established, the cyanosis clears off; skin grows rosy.

Autopsy: hæmorrhagic spots on pericardium and pleuræ; liquor amnii or froth in trachea, mouth, stomach.

Of R.—No cyanosis; skin pallid; limbs flaccid; heart-beat faint; generally fatal. *Autopsy*: marks of brain injury, or effusions in calvarium.

c.—In premature children air-cells not developed; atelectasis.

Duration of Asphyxia with probability of recovery.—Variable; much longer than in adult. Fœtus consumes less O.

Treatment.—Applies especially to simple asphyxia. Two modes of action:

1. *Excitation of diastaltic function.*

2. *Artificial respiration* (Marshall Hall; Sylvester; Howard).

Direct insufflation.—Mouth to mouth; Richardson's bellows; Ribemont's tube. Importance of warmth.

Medico-legal appreciation.—Diagnosis of natural from artificial respiration.

Icterus.

Erysipelas.

Malformations.—Anencephalia; spina bifida; exomphalos; cleft palate; hare-lip; imperforate anus; reputed hermaphroditism; spontaneous amputation of limbs in utero.

XIV.

REMANENT LESIONS AND DISEASES FROM PREGNANCY AND LABOUR.

Every tissue and every organ has been tested under high pressure.

Few subjects go through the trial scatheless.

Traces of the damage suffered in the struggle will commonly be found in some organ or tissue.

A. *Some of the physiological exaggerations of organs and tissues* described as arising during pregnancy remain.

B. *Some pathological diatheses or organic lesions latent until pregnancy supervened*, and evoked by that process, persist in evidence.

C. *Traumatic lesions.*

A. PHYSIOLOGICAL EXAGGERATIONS.

Vascular system.—Anæmia; hypertrophy of heart; venectases, as piles or varicosities on legs and vulva; goitre; exophthalmos.

Liver.—Granular change.

Kidneys.—Granular change may be started.

Bladder.—Loss of tone; paralysis, cystitis.

Intestinal canal.—Paralysis.

Neurotic affections.—Deafness, amaurosis, aphonia.

Uterus.—Paralysis; subinvolution; menorrhagia; amenorrhœa, sterility.

Pigmentation.—Face, mammary areolæ, abdomen.

B. PATHOLOGICAL DIATHESES AND ORGANIC LESIONS EVOKED OR INTENSIFIED.

Struma, revealed in pelvic inflammations; tuberculosis and mastitis.

Heart.—Hypertrophy; goitre, exophthalmos.

Liver and kidney diseases.

Lungs.—Bronchiectasis; emphysema; phthisis.

Neuroses.—Insanity; chorea, epilepsy, ague.

C. TRAUMATIC INJURIES.

Skin.—Cracks or scars, evidence of stretching; breasts, abdomen, thighs: fallacies, and appreciation of these.

Separation of recti abdominis muscles.—Ventral or umbilical hernia.

Loss of tone of abdominal walls.—Pendulous belly.

Uterus.—Fissures of neck entailing subinvolution, endometritis, ulceration, perimetritis, sterility (Whitehead ; Emmet), paralysis, menorrhagia.

Vagina.—Relaxed ; rectocele, cystocele, uterine displacements ; sloughing leading to fistulæ, cicatricial contractions.

Perinæum.—Relaxed ; torn at fourchette or beyond, or perforated. Relaxation or inflammation of *pelvic joints*.

General proposition.—Each step in the history of reproduction in woman is marked by traumatic lesion : (1) Rupture of Graafian follicle or ovisac ; (2) rupture of hymen ; (3) disruption of ovum from uterus ; (4) tearing of os uteri externum ; (5) rupture of perinæum (R. B.).

EVIDENCES OF PAST GESTATION, OF NULLIPARITY, AND OF VIRGINITY.

A. *In the living.*—1. Of completed gestation and labour at term, recent and remote. 2. Of incompleted gestation, abortion, or premature labour, recent and remote.

B. *In the dead.*—Recent and remote.

A. Some of the conditions enumerated under '*Remanent lesions and diseases.*'

1. *In the recently-delivered at term.*—Fullness of breasts and secretion of milk ; skin and abdominal walls lax, flaccid ; uterus enlarged, as determined by bi-manual palpation ; cervix soft, fissured, large, open ; vagina loose, large, free mucous secretion, perhaps streaked with blood ; perinæum lax or gaping.

These conditions, excepting the milk secretion, tend to subside after a month.

2. *After recent abortion.*—The chief signs are soft relaxed vagina, free mucous secretion, enlarged uterus, dilated os, added to the '*remanent conditions of early pregnancy.*'

The evidence of remote abortion is too uncertain to justify a positive opinion.

Nulliparity.—*Negative evidence*: absence of the usual remanent conditions of gestation. *Positive*: small conical vaginal-portion, with minute round os externum; with this, the lax vagina and vulva, indicating sexual relations. *Fallacies*.

Virginity.—*Negative evidence*: absence of remanent conditions of gestation. *Positive*: the hymen, narrow contractile vagina, persistence of rugæ; a small smooth vaginal-portion and os uteri. *Fallacies*: surgical treatment or accident may have displaced the positive signs; hymen may survive sexual intercourse, gestation, and even labour.

B. IN THE DEAD.—*Past pregnancy at term.*—*Recent* (within a month) the corpus luteum in ovary tending to cicatrization; the weight of uterus exceeding 1,200 grains, length exceeding three inches; uterine sinuses visible, some with clots; mucous membrane not re-formed, cervical canal large, arbor vitæ less distinct, free secretion, recent laceration of os externum; ecchymosis of vaginal-portion; serous effusion in pericervical connective tissue; arching of fundus uteri.

Vagina lax, rugæ somewhat smoothed out, remains of ecchymoses. Perinæum: recent wound of fourchette, or beyond.

Breasts enlarged; milk in lacteal ducts.

After a month the above signs less conspicuous: the arched fundus remains; the vaginal-portion fissured in lobes, thickened; perinæum cicatrised.

Fallacies: surgical treatment, especially removal of uterine polypus, or tumour of large size.

Lineæ albicantes on breasts, abdomen, thighs.

Fallacies negative and affirmative.

After abortion: recent.—Corpus luteum showing cavity and surrounding vascularity according to lapse of time from conception. Vascularity of tubes, ovaries, and uterus; mucous membranes showing shreds of decidua; sero-sanguineous or puriform secretion in uterus and tubes; uterus above normal weight and bulk; vagina lax.

XV.

PUERPERY.

Changes undergone in puerperry.—1. *Sudden diversion of blood-flow from pelvis*; analogy to diversion of child's blood from placenta on tying cord.

1a. Contraction of uterus, tonic, squeezing out superfluous blood, and serum.

The *lochia*, at first sanguineous, then sero-sanguinolent, serous and purulent. *Duration*: 10 to 15 days. *Quantity*: 1500 gram. (Gassner). *Odour*: the 'gravis odor puerperii.' *Microscopic characters*: leucocytes, red globules, pavement-epithelial cells, decidual debris, cholesterine, granules of fat, microbes, bacteria, trichomonas vaginalis (Donné). Reaction at first alkaline, then acid; contains salts.

2. *Lowering of nervous tension.*

3. *Lowering of vascular tension.*—This becomes established on second or third day. Fall of pulse.

4. *Rapid disintegration (fatty) of uterine tissue* and of other tissues developed for purposes of gestation and labour (involution).

5. *Active absorption of waste-tissue.*

6. *Rapid excretion.*

General propositions.—1. *During gestation* developmental force in pelvis maintains high vascular tension and active constructive energy; i.e. eccentric or peripheral vascular fulness.

2. *After labour*: developmental force in pelvis arrested; moderate functional activity of breasts; fall of vascular tension, no longer eccentric vascular, but reverse action of absorption to carry away waste-stuff. Demolition, absorption, and excretion take the place of construction. Pregnancy is marked by active exosmosis; puerperry by active endosmosis.

Lactation.—Secretion of milk sets in on second or third day.

General phenomena : slight rise of temperature and pulse ; discussion of significance of this rise. *Local phenomena* : breasts swell, become tense, tender ; pressure on nipple causes oozing of milk.

Milk.—Composition : serum or fluid ; colostrum corpuscles (at first), fat globules. Water, 889 parts ; solid parts, 111, of which 39 casein, 27 butter, 44 sugar of milk, 1 to 2 inorganic salts.

Duration of lactation : nine months normally ; suspension of menstruation ; inaptitude for conception ; exceptions. Significance of return of menstruation ; effect upon the milk and health of woman.

Gestation and lactation concurrent. Three lives implicated. What should be done ?

Involution of uterus.—*Time* required for : about one month. *Favouring conditions* : healthy lungs, liver, kidneys, skin, lymphatics ; healthy breasts and suckling.

Retarding conditions : reverse of the above ; displacements of uterus ; perimetritic inflammations ; bad sanitary surroundings, as foul air ; hospital air. Fever from any cause. Defective nutrition. Diatheses : as strumous, syphilitic, tuberculous, malarious.

The mortality in puerpery : statistics of ; comparison between domiciliary and hospital practice. In hospitals, added risk of heterogenetic infection ; in domiciliary probably 1 per cent. at least.

WHAT TO OBSERVE IN THE PUERPERA.

Objective observations.—*Aspect* ; *pulse* ; *temperature* ; *respiration* ; state of *bladder* ; feel *abdomen* as to pain, distension, and condition of uterus ; *decubitus* and position of limbs. Examine *discharges* ; lochia, hæmorrhage, clots, decidual or placental shreds. *Breasts*, as to secretion of milk ; the fitness of the nipples for suckling ; tension or tenderness as threatening

inflammation. The *secretions*: urine; fæces; perspiration; the *tongue*. *Speech*, articulation and matter; *manner*.

Subjective, or information from patient and nurse. Chills, rigors, sleep, pain, faintness, appetite for food and drink.

CARE OF THE PUERPERA.

The *binder*: uses of.

Decubitus, dorsal or lateral; shoulders moderately raised.

Lochia.—Reception of; discard diapers, use antiseptic pads.

Washing and syringing to be done with antiseptic fluid. Sponges to be kept in antiseptic fluid. Towels washed in antiseptics.

Food.—Light, as broth, beef-tea, milk, first two days; thence more copious, gradually adding solids. Drink moderate in quantity; stimulants sparingly.

Medicines.—Quinia, ergot, digitalis, for first fortnight.

Sedatives: opium if necessary.

Aperients and enemata.

(See further under Treatment of Septicæmia.)

Ventilation; warming; removal of foul matter.

Rest in seclusion fourteen to twenty-one days.

The breasts.—Avoid manipulation as a rule; gentle rubbing with oil and spirit from periphery at times useful. Breast-pump to draw nipple if flat. Packing in wool. If patient is not to suckle: aconite, internally; belladonna; firm support to breasts. When milk is deficient, electricity, castor-oil leaves to breasts, but care to avoid carrying stimulation too far.

XVI.

ACCIDENTS DURING PUERPERY.

Results of traumatic injury, not from infection: pelvic cellulitis; pelvic peritonitis; hæmatocele; vaginitis.

INFLAMMATION OF BREASTS ; MASTITIS.

Rare during pregnancy. After labour.

Favouring conditions.—Strumous diathesis ; short or retracted nipples ; fissures and excoriations ; delicate nurture, high cultivation of nervous system at expense of muscular and glandular systems. Breast-glands unfit for work.

Causes.—Arrest of milk-secretion from cold, exposure, fever, or pelvic inflammations ; injudicious manipulation.

Two dates of origin : (1) Soon after labour ; (2) after exhaustion from protracted lactation.

Course.—Intense engorgement, pain in breast, generally worse in one. Issue in resolution or in suppuration. Some fever, rarely septicæmia marked.

Treatment.—To promote resolution : salines, gentle pressure upon breasts. Use of belladonna, iodide of potassium. After suppuration : do not open abscess until it points, open antiseptically ; then firm pressure by compresses and straps from below upwards (Trousseau).

Quinia—fair nourishment.

THE TOXÆMIC DISORDERS OF PUERPERY.

GENERAL UNDERLYING CONDITIONS.

1. Blood-poisoning in puerpery is :—(A) *Autogenetic*, arising from processes inherent to the subject ; or (B) *heterogenetic*, result of infection from without. (R. B.)

2. *The diseases of puerpery are the diseases of low vascular tension.*

3. So long as excretion of waste stuff keeps pace with its disintegration and absorption, the condition is physiological. This depends upon healthy organs and freedom from morbid diathesis.

4. When the *physiological equilibrium* between absorption and excretion is *disturbed*, waste stuff accumulates in the blood—*toxæmia*.

Summary of forms of puerperal toxæmia (R. B.) :—1. From lactic acid resulting from waste of muscle during severe labour. Self-empoisonment from accumulation of waste-stuff of involution. *Endosepsis*. These underlie all the diseases of puerpery.

2. Self-empoisonment from absorption of foul stuff of decomposition in cavity of uterus. *Autosepsis*.

3. Empoisonment from foreign sources. *Exosepsis*.

Thus there may be a *simple endosepsis*; but autosepsis is grafted upon endosepsis; and exosepsis is a compound of all three.

Autosepsis and exosepsis especially *infectious*.

The *factors of autosepsis* are: (a) The watery and hyperinotic blood of the gravida; (b) disturbed equilibrium between absorption and excretion; (c) a surface whence foul stuff is absorbed. This is generally some part of the genital mucous tract bared of epithelium—as the placental site, the cervical membrane bared by necrosis from friction during labour (R. B.), the torn cervix, vaginal mucous membrane bared by necrosis like that of cervix, the torn perinæum. But absorption is possible from uninjured surfaces.

Septic matter may be result of decomposition of retained placenta, blood or lochial discharge. Retention may be due to bagging down of uterus, or retroflexion.

TOXÆMIA LOCALISED OR LIMITED.

Phlegmasia Dolens = *Thrombosis*.

Definition.—Clotting of blood in veins and lymphatics.

Factors of: hyperinotic blood; entry of poison into it, causing precipitation of fibrin; clotting with similar condition in lymphatics from uterus.

Favouring conditions.—Hæmorrhage during labour, which increases proportion of fibrin in blood, and renders absorption more active; local stagnation of blood (Lancereaux).

Significance of.—Indicates fairly healthy blood reacting against poison, opposing entry of excess into general circulation. It is a localised toxæmia. A conservative process. Begins within fourteen days after labour.

Course and symptoms.—In favourable cases, *adhesive phlegmasia* (Cruveilhier) and lymphangitis; fever moderate; swelling of one leg, occasionally of both in succession; white, tense, hardly pitting, if pricked oozing of coagulable serum; loss of power over leg; pain on pressure, especially in the popliteal space, and in course of femoral vessels, knotty prominences there from enlarged lymphatics. Gradual absorption of thrombus. Danger of embolia from breaking off of thrombus from affected veins.

Duration.—Forty to fifty days.

Treatment.—Rest; elevation of leg; packing in cotton-wool and oil-silk. Salines with ammonia, quinia, opium. Light nutrition.

Course in unfavourable cases.—*Suppurative phlegmasia* (Cruveilhier). Clotting in femoral vessels imperfect. Poison invades system. Failure to localise. The poison breaks bounds, merging into general toxæmia. Fever; often death.

THROMBOSIS AND EMBOLIA other than the so-called phlegmasia dolens.

1. *Systemic arterial thrombosis*; may result from violent emotion; may result from venous thrombosis and embola carried through to left heart; from embola detached from valves of heart.

Course and symptoms.—From three to ten days after labour; obstruction of arteries of limb; intense pain at first; gangrene; stoppage of pulse; and fall of temperature of limb. Issues, death or separation of gangrened limb.

2. *Pulmonary thrombosis or embolia.*

An embolon or septic matter carried from right heart into pulmonary artery; impaction of embolon, rapid thrombosis upon it. Sudden severe dyspnoea, rapid death in severe cases.

In cases of finely-divided embola, broncho-pneumonia may arise, abscess of lung, death or recovery (Virchow). Pulmonary infarction may set in soon after labour.

Treatment.—Absolute rest; ammonia, subcutaneous injection of ether, leeches to heart or chest.

PELVIC CELLULITIS, OR PARAMETRITIS; PELVIC PERITONITIS, OR PERIMETRITIS; METRO-PERITONITIS; INFLAMMATION OF THE BROAD LIGAMENTS.

General Proposition.—Inflammation is rarely limited to one tissue. Commonly inflammation of the connective tissue of the broad ligaments is complicated with pelvic peritonitis.

Favouring conditions.—Strumous diathesis, hæmorrhage at labour; severe injury of parturient canal. Structures the seat of recent physiological activity liable to inflammation on slight disturbing causes.

Origin.—Septic matter brought by lymphatics and veins from uterus to broad ligaments. Analogy to thrombosis. Lymphangitis, phlegmasia; sometimes by cold, checking excretion; by premature exertion; by coitus. Rarely begins before third day. Onset marked by fever; sometimes rigor and vomiting, pain in pelvis. Local signs: uterus generally set fast low in pelvis; hard swelling in one or other or both broad ligaments; sometimes when peritonitis predominates, in Douglas' pouch behind uterus; sometimes in tissue between uterus and bladder.

Peritonitis may be caused by escape of foul stuff from Fallopian tubes (*salpingitis*).

Course.—May end in resolution; in abscess. Abscess may burst in a mucous canal; into peritoneum, or externally in groin. Sometimes fatal from exhaustion and pyæmia. Recovery tedious.

Treatment.—Absolute rest; fomentations; washing out uterus once or twice; salines, then quinia, opium, digitalis, veratria; light nourishment. *Local:* to open abscess in most prominent pointing spot; if by rectum or vagina, by aspirator-trocar.

XVII.

PUERPERAL FEVER (so-called).

General term to express, 'Fever in a puerpera.'

Clinical analysis necessary to diagnose the nature and origin of the fever.

Is there a specific *puerperal poison*?

If there be, it must be sought in the conditions specified under 'Endosepsis' and 'Autosepsis.'

GENERAL PUERPERAL SEPTICÆMIA : PUERPERAL FEVER.

(See propositions on Endosepsis, Autosepsis, Exosepsis).

A. *Endosepsis and Autosepsis*.—Endosepsis, the only simple Puerperal Fever.

Favouring conditions.—Fall of vascular tension; increased activity of absorption. Hæmorrhage in labour. Albuminuria. Severe labour; dead child.

Barriers against infection.—1. Contraction of uterus. 2. Integrity of glands and lymphatics. 3. Supply of good nourishment. 4. Establishment of lactation.

'*Milk fever*' (so-called), or *ephemeral fever*.—The febrile movement, rigor, rise of temperature and pulse on third day attributed to formation of milk, really due to slight endosepsis on first setting-in of absorption of waste stuff of involution-process (Winckel).

Endoseptic poisons have a feeble reproductive and infective power. Hence duration of fever is greatly determined by the continuous supply of poison.

B. *Exosepsis, or heterogenetic septicæmia*.

Under greatly increased activity of absorption process, system peculiarly susceptible to infection from without. It is increased by hæmorrhage.

Hence liable to invasion by zymotic poisons. Acquired

protection is weakened. Variola, scarlatina, rubeola, typhoid, erysipelas.

Modes of infection.—By linen, contact with persons suffering from the zymotics; convection by persons and clothes which have been in contact with zymotic disease. Hospital infection.

Sewage-poison. Convection by air, by water, by milk.

Cadaveric poison: convection by touch. In many instances assumed cadaveric poison is zymotic, as scarlatina, of which subject died.

The theory of minute capillary thromboses and embolism to account for rheumatism, cellulitis, synovitis. (Virchow.)

The zymotic poisons have active, self-reproductive, and infective properties. Hence one infection is enough. The disease runs the course of the particular zymotic, modified by the puerperal process.

Doubtful if autogenetic toxæmia is reproductive.

In hospitals, infection by linen, sponges, touch-inoculation, air, bacteria, zymotics imported.

Date of invasion.—Rarely before the third day, or after fifteenth day.

Classification of symptoms:—

1. *Signs of invasion.*—Rigors; headache; backache; hysteria; depression; fainting; minor degrees of shock; rise of temperature 101° to 103° F.; rise of pulse to 100, 110, 120; wavering pulse; respirations 25–30. The ‘*gravis odor puerperii*.’

2. *Signs of reaction or elimination.*—Tumultuous action of heart; pulse irregular; vomiting, diarrhoea, sweating; further rise of temperature and pulse, respirations 25–35; if absorption of septic stuff goes on, rigors repeated; delirium; arrest of excretion, of milk-secretion and lochia.

3. *General infection marked.*—Rheumatic pains in joints, diffuse cellulitis, inflammation of muscles, abscess, ophthalmia; jaundice; pleurisy, pericarditis, peritonitis; pulse, temperature, respiration, all rise.

Prognosis favourable ; pulse and temperature fall and become steady, aspect improves.

Prognosis unfavourable ; temperature high or falling rapidly, pulse 140-160 small, respirations 40 ; aspect sunken, septicæmic cachexia, delirium, sordes in mouth, tympanitis. Aphthæ, diphtheritic patches on traumatic surfaces and vagina.

Pathological anatomy.—1. In *phlegmasia dolens* : veins of broad ligaments, external iliacs, femorals, and sometimes internal iliacs, vena cava, and lymphatics blocked by coagula ; in fatal cases, the clots breaking down by fatty degeneration and dissolution. Hence one source of embolism.

Vessels in broad ligaments, and in femoral regions matted together by effused lymph. Lymphatics affected like the veins. Cellular tissue infiltrated with serum. Sometimes diffuse sup-puration in connective tissue.

2. In *endosepsis* there may be no distinct post-mortem appearances.

3. In *autosepsis* : uterus enlarged ; placental site has a purulent or gangrenous appearance ; uterine sinuses and lymphatics inflamed, distended with soft or broken coagula and pus ; sometimes peritonitis and pelvic cellulitis ; pleurisy, pericarditis, pneumonia ; oöphoritis ; abscess of ovaries.

4. In *exosepsis*, as from scarlatina, there may be no marked post-mortem appearances, but generally they resemble those of autosepsis.

Infection.—Exosepsis communicable to physician, nurse, child, and to husband on sexual intercourse. In these cases the fever is probably scarlatina, erysipelas, or typhoid.

Prophylaxis: Antiseptic midwifery.—1. *Isolate the puerpera* as much as possible.

2. Keep the door shut against autosepsis by maintaining contraction of the uterus ; give quinia, ergot, digitalis from second day ; the binder.

3. Prevent poison from forming and collecting in the par-

turient canal by irrigating with antiseptic fluids ; drainage. Use of the syphon-irrigator.

4. Eject the poison as fast as it effects an entry ; that is, keep the excretory organs in activity.

5. Guard the lying-in chamber against the approach of foreign poisons.

6. Fortify the patient against attack by due supplies of wholesome food.

Treatment.—Quinia, veratrum, aconite, salicylic acid, digitalis ; later, brandy. Turpentine ; nutrient enemata ; transfusion.

Packing abdomen with cotton-wool, if peritonitis.

NERVOUS ACCIDENTS IN PUERPERY.

Paralysis of uterus.

„ of bladder.

„ of intestines—ileus.

„ of organs of sense ; deafness ; amaurosis, from anæmia, exhaustion, albuminuria.

Paraplegia from shock, exhaustion after labour ; may follow epilepsy or albuminuria, or may arise from pressure on sacral plexus during labour.

Partial paraplegia from bruising of sciatic nerve by forceps or head.

Reflex paraplegia, a kind of shock.

Hemiplegia, from effusion on brain, or congestion.

Convulsions : epileptiform ; uræmic.

Delirium, symptomatic of fever.

Sudden death from shock, thrombosis, embolism.

INSANITY.

Characters.—1. Hilarity and obscenity. 2. Melancholic. 3. Maniacal, suicidal. No insanity special to puerperal state.

Causes.—Predisposing : hereditary proclivity. Changes,

nervous and vascular, of pregnancy. The nervous disturbances of pregnancy may explode in insanity after labour. Blood disorders: cholæmia, albuminuria (follows on convulsion); spanæmia or anæmia, the septicæmia of puerpery; hæmorrhages; hypertrophy and valvular disease of heart; uterine disease and displacement; ovarian disease.

Immediate cause.—A reaction between exhausted nervous energy, degraded or empoisoned blood, and shock physical and emotional.

Occurs during: 1. Gestation. 2. Labour. 3. Puerpery. 4. Lactation.

Symptoms.—‘Excitement without power’ (diagnosis from delirium of fever; often no marked increase of pulse or temperature in insanity); violence; refusal to take food; suspicion; dislike of husband and child; but the manifestations vary. Insanity sometimes occurs after protracted suckling; then generally melancholic.

Prognosis.—Recovery in most cases within a year; in some, disorder is protracted or permanent; in some, death within a few weeks.

Treatment.—Seclusion; quiet; removal of causes of irritation; examine to ascertain freedom from displacement or other disorder of uterus.

Sedatives: opium, digitalis, chloral.

Salines, with ammonia, of great value.

Tonics: quinia; cod-liver oil.

Food, nutritious; if refused by mouth, given by rectum, or by œsophageal tube.

TETANUS.

May follow abortion or labour.

Has followed attempts to remove adherent ovum or placenta, and plugging vagina; exposure to cold and wet may be fatal.

Most frequent in tropical countries.

Treatment.—Absolute rest; nitrite of amyl; chloroform; nitro-glycerine.

XVIII.

DIFFICULT LABOUR.

Definitions.—*Eutocia*: 'labour proceeding smoothly and terminating favourably under the natural forces.'

Dystocia: 'fit partus *difficilis et laboriosus*, quod nec modo neque ordine debito res peragatur aut pravis aliquibus symptomatibus impediatur' (Harvey). To this may be added labours requiring assistance.

SIGNS OF EUTOCIA.

Cheerfulness; absence of restlessness; ability to walk about; regular recurring pains not producing distress; perfect remission between pains; a sense of something gained by the pains, 'they do good;' moderate rise of pulse during pains; normal temperature; pale urine.

SIGNS OF DYSTOCIA.

General proposition.—Dystocia may arise from: (1) Error in any one or more of the three factors of labour, i.e. of the body to be expelled, or of the resisting force, or of the expelling force; or (2) from a loss of correlation between these factors.

1. The *general signs*.—Pain affecting the heart's action; irritability of mind; anxiety; restlessness; pain continuous; uterine contraction causing pain in uterus and abdomen; or being abortive or fleeting; continuous rigidity of uterus (Braxton-Hicks); pulse rising; temperature rising; scanty high-coloured urine; repeated vomiting.

2. *Local signs*.—Tenderness of abdomen on pressure; *ex. per vaginam*—tenderness and heat of vagina; tumid or unyielding state of os uteri: stationary position of fœtus; increasing tumefaction of child's scalp if alive.

WHAT IS THE CAUSE OF DYSTOCIA ?

1. Does it lie in *defect of expelling power ? i.e. in inertia.*

This is inferred if the pelvis and maternal passages offer no obstruction, the child presenting favourably, and yet the uterine contractions are too feeble to propel.

Oxytocics.

Does it lie in *excess or other perversion of expelling power ?*

Epechontocics.

Does it lie in *excess of resisting power ?*

This may be inferred if the pains are strong and regular, and yet fail to propel the child.

What is the cause of this resistance ?

The fault may lie in the child or in the mother.

1. Fault lies with the child : this may be from *disproportion.*

CLINICAL CLASSIFICATION OF CASES OF DISPROPORTION.

1. *Disproportion that can be overcome without injury to mother and with probable safety to the child.*

Treatment.—A. By increasing the *vis à tergo*, or driving force—*oxytocics* ; ergot, cinnamon, borax.

Pressure on uterus ; expression, or manual pushing out.

B. By putting on *vis à fronte*, or traction force.

The forceps, lever, if head presents.

Traction by hand, if breech presents.

2. *Disproportion that can be overcome without injury to mother, but with sacrifice of child.*

Treatment.—*To reduce bulk of child.*—Perforator, crotchet, cephalotribe, cranioclast, forceps saw, wire *écraseur*, embryotome.

3. *Disproportion beyond either of the preceding cases, but to be overcome with possible or probable safety to mother and child.*

Treatment.—*Cæsarian section* in its various modifications.

SPECIAL CAUSES OF DYSTOCIA FROM FŒTUS.

A. *Obstacles occurring with healthy fœtus :—*

- a. Anomalies of presentation and position of breech, trunk, and face. Cord round neck, or short.
- b. Inclinations in presentations of vertex. Errors in movements of descent and rotation.
- c. Association of one or more members with the presenting part; nuchal hitching of an arm.
- d. Excessive development of fœtus in head, shoulders, body; in ossification, cranium not plastic, more common in boys.

B. *Obstacles from pathological conditions of fœtus :—*

- a. Hydrocephalus.
- b. Hydrothorax.
- c. Anasarca.
- d. Distension of bladder.
- e. Tumours on surface of body.
- f. Deviations of spinal column.
- g. Spina bifida.
- h. Ascites.
- i. Emphysema.
- k. Enlargement of kidneys and liver.
- l. Anchylosis of limbs.

C. *Death or impending death of fœtus.*D. *Head detached, remaining in utero.*E. *Multiplicity of fœtuses :—*

- a. Fœtuses in separate sacs; wasted expelling force.
- b. In one sac, or adherent.
- c. Entanglement.

F. *Monsters.*G. *Ectopic gestation.*H. *Adhesions of fœtus to uterus or placenta.*

DYSTOCIA FROM THE RESISTANCE ENCOUNTERED IN THE PARTURIENT CANAL.

A. *In the soft parts.*—In the *cervix uteri*: rigidity; spasm or perverted polarity; œdema; thrombus; occlusion of the os uteri, membranous or cicatricial; hypertrophy; cancerous degeneration; tumours. In *uterus*: tumours; polypi.

Malposition of the uterus.—Excessive obliquity; ante-flexion or overhanging; partial retroversion.

In the vagina.—Rigidity; occlusion; cicatricial or cancerous contractions; thrombus; tumours; in some primiparæ, the hymen.

In vulva.—Rigidity; cicatricial or cancerous contractions; thrombus; tumours.

B. *From faults of the bony canal.*—Contractions may exist at brim, in cavity, or at outlet.

ANALYSIS OF DEFORMITIES OF PELVIS.

General proposition.—Stein the younger's law: *like causative diseases produce like forms of pelvis.*

1. *The rickety pelvis.*—The disease begins in childhood; pelvis flattened in conjugate diameter; projecting promontory; sometimes incurvation of sacrum; outlet less contracted than brim; narrowing of pubic arch. The 'simple flat rachitic pelvis;' pelvis generally smaller and lighter than the standard. Bones rigid.

In some cases the *lumbo-vertebral column* is so greatly lordotic that it projects over the pelvic brim, impeding entry into it.

Diagnosis.—The rickety aspect; dwarfing of stature; prominent belly; internal examination: touching the promontory with the finger.

Pelvimetry.—*Uses of the pelvimeter*: external measurements as an indication to internal dimensions.

Mechanism of Labour in.

1. In *rickety pelvis*, promontory projecting in *minor degree* : head presents at brim in transverse position ; does not enter pelvic cavity syncritically, but revolves round promontory in 'Barnes' curve' ; then rotates, and emerges in 'Carus' curve.' Head gets compressed, or indented laterally.

In *greater degree* : head jammed in brim of cavity, cannot rotate ; head is arrested on brim ; forceps, turning, craniotomy, cephalotripsy, Cæsarian section.

Definition of *Arrest* and *Impaction*.

2. *The osteomalacic pelvis*.—Disease sets in after puberty, osseous matter removed, plastic framework remains ; cordate or trefoil brim ; general concentric collapse of bony canal ; all dimensions contracted at brim, cavity, and outlet ; closing of pubic arch ; rostrated protrusion of pubic rami.

Pelvis sometimes remains plastic.

Diagnosis.—Loss of stature, squatting of body ; the rostrated symphysis seized by finger and thumb ; internal examination : difficult introduction of one or two fingers.

Mechanism of labour in.—Sometimes soft pelvis opened up by hand ; then turning, forceps or craniotomy ; generally Cæsarian section.

3. *The funnel-shaped pelvis*.—The brim retains nearly normal dimensions ; pelvic channel narrowing to outlet.

Diagnosis.—measuring outlet by fingers.

Mechanism of labour.—Head enters pelvis normally ; rotation impeded ; arrest or impaction at floor of pelvis.

Treatment.—Forceps, turning, or embryotomy.

4. *The kyphotic pelvis*.—'Robert's pelvis,' result of spinal kyphosis. Brim contracted transversely, lengthened conjugately, so that diameters are reversed, resembling pelvis of lower mammalia, effacement of promontory.

Diagnosis.—The spinal kyphosis ; by internal examination, showing the flat promontory, and long conjugate diameter of brim.

Mechanism of labour.—Head may enter long diameter in conjugate ; craniotomy or Cæsarian section has been necessary.

5. *The spondylolisthetic pelvis.*—From disease of last lumbar vertebræ, these slide down into the pelvic cavity, forming a false promontory, more or less blocking the pelvis.

Diagnosis.—*External examination.*—The sudden depression of spine above sacrum ; the projection of the abdomen ; overhanging uterus.

Internal examination.—The lumbar vertebræ intruding into the pelvic cavity.

Mechanism of labour.—Head arrested above pelvis, or if entering, impacted. Cephalotomy or Cæsarian section.

6. *The pelvis obliqué-ovata of Naegele.*—From disease mostly of the sacro-iliac articulation leading to ankylosis, arresting development of one side of the pelvis, congenital or acquired.

Diagnosis.—By external observation and measurements, comparative, of two sides ; by observing that symphysis pubis is to right or left of median line ; by internal examination : showing that the two sides of the brim are unequal.

Mechanism of labour.—Due adaptations and movements of head prevented ; arrest or impaction ; generally craniotomy.

7. *The thorny pelvis.*—‘*Acanthopelys of Kilian,*’ from syphilitic, strumous, or rheumatic disease ; processes, in spikes or sharp ridges, shoot out from the pelvic bones.

Diagnosis difficult. May cause laceration of uterus and arrest of child ; Cæsarian section indicated.

8. *Bony, fibrous, or sarcomatous outgrowths* from the pelvis, chiefly from the sacrum ; blocking the cavity.

Diagnosis.—By vaginal and rectal touch.

Mechanism of labour.—Head arrested or impacted. Craniotomy or Cæsarian section.

9 and 10. *The pelvis æquabiliter justo major and pelvis æquabiliter justo minor.*

11. *Undue depth of pubic symphysis.*

c. *From mechanical complications outside the uterus, the pelvis being normal.*

Tumours.—1. *In abdominal cavity.*—Cystic liver, cystic kidney, malignant tumours of omentum, abdominal gestation sac, ovarian.

How affecting labour.—(1) May push gravid uterus away from pelvic axis, preventing child entering; (2) may partially obstruct entry of child; (3) may impede expulsive forces; (4) cysts may rupture, causing shock and internal hæmorrhage, or inflammation; ovarian tumours may be twisted on their pedicles.

2. *In pelvis.*—Ectopic gestation-sac, ovarian, dermoid, and cystic; fibroid tumour parted from or but slenderly attached to uterus.

How affecting labour.—May prevent entry of child into pelvis by blocking brim or cavity.

Treatment.—(1) The tumour is movable, and may be pushed out of the way; (2) it may be lessened in bulk by tapping; (3) it may be removed by laparotomy; (4) the child may with-out or with acting on the tumour be delivered by forceps, turning, or embryotomy, or Cæsarian section.

XIX.

THE ARMAMENTARIUM OBSTETRICIUM.

At the head of all obstetric instruments is the obstetric hand.

THE CONTENTS OF THE OBSTETRIC BAG.

A. *Instruments to save the child: Conservative.*—1. Lever, superfluous. 2. A long double-curved forceps. Barnes' or Tarnier's axis-traction forceps. 3. Robertson's or other contrivance to return prolapsed funis. 4. Richardson's or Ribemont's apparatus to restore child from asphyxia.

B. *Instruments to reduce the bulk of the child: Sacrificial.*—5. A craniotome or perforator. 6. A crotchet. 7. A craniotomy-forceps or cranioclast. 8. A cephalotribe. 9. A strong

wire écraseur and embryotomy-scissors. 10. Ramsbotham's or Braun's decapitating hook. 11. A blunt hook, slightly flexible.

c. *For Cæsarian section and restoring perinæum*.—12. Bistouri and scissors for laparotomy; sutures; ligatures; needles; needle-holder; artery-forceps.

d. *To induce or accelerate labour*.—13. A blunt-ended straight bistouri to incise the cervix in cases of occlusion, extreme contraction or cicatrisation. 14. A Higginson's syringe with a flexible uterine tube, nine inches long, for injecting hot or cold water, or styptics, or for antiseptic irrigation. This also serves to expand 15, a set of Barnes' hydrostatic dilators. 16. Three or four male elastic bougies, Nos. 8 and 9. 17. A flexible male catheter. 18. A porcupine quill to rupture the membranes is useful. 19. Scissors and thread.

e. *To restore the mother*.—20. A hypodermic syringe to hold 60m. 21. A transfusion apparatus.

f. *Medicines*.—22. Chloroform or ether for anæsthetics. Ether for subcutaneous injection. 23. Chloral. 24. Laudanum; morphia for sub-cutaneous injection. 25. Nitrite of amyl. 26. Nitro-glycerine. 27. Ergot of rye. 28. Perchloride or persulphate of iron. 29. Carbolic acid. 30. Vaseline with carbolic acid 1 in 20, or boracic acid. 31. Salines, for intra-venous injection.

THE ESSENTIALS OF EFFECTIVE INSTRUMENTS.

The forceps.—A true *long forceps* is one that, whilst seizing the head on the pelvic brim, has its lock and handle clear outside the vulva. It must have a moderate head-curve and a moderate pelvic curve. Tarnier's axis-traction forceps, principle and uses of. Barnes' is the most generally useful. A. R. Simpson's modification of Tarnier's axis-forceps is very promising, but it is too short. Upon the perfectionment of the forceps and the cultivation of the hand rest the main hope of advance in conservative obstetrics.

The craniotome must be *straight and powerful*.—Oldham's is the best.

The craniotomy-forceps must have blades slightly curved, duck-billed and parallel in the grip. It must be in two pieces, joining by a lock after application, and adapted with a compressing screw. Simpson's, Barnes', Hall Davis', Matthews', are good models.

The cephalotribe.—The continental instruments are generally too bulky. Braxton-Hicks' is a good model, but rather too short. Kidd's is straight, and is perhaps better.

The *écraseur*, or some other contrivance like Van Huevel's forceps-saw, for lamination of the foetal head may be of occasional use. The *écraseur* also useful for decapitation. (The basilyst, for breaking up the basis of the skull, is approved by some.—A. R. Simpson.)

Barnes' hydrostatic bags.—Many defective models sold. There should be a series of three. The general shape is that of a fiddle. The upper border should be slightly concave, so that the head-globe may rest in the concavity. The sides should be concave, so as to be embraced by the cervix obviating slipping into the uterus or back into the vagina; the distending force is thus expended upon the cervix with slightly superior force at the ora internum and externum. They should be made of good india-rubber. They are introduced by help of a sound, which, fitting into a small pouch near the fundus, carries the bag up into place. The permanent sound running in the centre of the bag, which some have thought an improvement, is really not so.

For administering *chloroform* an inhaler not necessary. A drachm or two at a time poured on a sponge in a tumbler will serve. Ether should be preferred to chloroform as less promotive of hæmorrhage.

An ounce of *pure ether* for subcutaneous injection should be carried in a distinct bottle. This suffices for eight injections.

Chloral syrup ʒij for rectal injection of ʒj–ij drachms, or ʒss–ʒj doses by mouth. But chloroform is safer.

<i>Nitrite of amyl</i>	} To moderate uterine action or convulsion.
<i>Nitro-glycerine</i>	

Ergot of rye in powders, or as liquid extract or ergotine.

Perchloride of iron, best carried solid, ℥vj-℥viij. For use, dissolve one ounce in ten ounces of tepid water.

Carbolic acid, in crystals, or in solution of definite strength for the dilution required.

The carbolised vaseline 1 in 20, or vaseline with boracic acid, should be in the bag. Cold cream, lard, oil, may be impure, and should be rigorously discarded.

XX.

THE OPERATIONS.

THE PREMATURE INDUCTION OF LABOUR.

A resource of conservative midwifery.

Object.—A proceeding, elective or urgent, adopted with the view of obviating or reducing the dangers to mother or child, or both, which threaten if gestation be continued, or if labour come on at term.

Definitions.—*The premature induction of labour* is the artificial arrest of gestation when seven months are completed, when the child reaches viability.

The induction of abortion is the artificial arrest of gestation in the earlier months before the child is viable.

The general conditions under which the operations have to be carried out.—1. The incomplete development of the nervous, circulatory, and glandular systems.

2. The immature development of the uterus; involving imperfect contractile power, imperfect dilatability of the cervix.

3. The child is smaller and more plastic than at term, abnormal presentations more frequent. Most of the accidents that may complicate labour and puerpery at term may complicate premature labour and abortion.

The process of artificial labour.—Two stages: (1) Provocative; (2) accelerative.

1. *The provocative agents.*—(1) *Medicinal*, acting mainly upon the spinal centre, some to a certain degree upon the uterine irritability : ergot, quinia, borax, cinnamon, faradisation, irritation of breasts. (2) *Local agents*, mostly mechanical, exciting diastaltic action peripherally ; introduction of bougies into uterus ; detachment of membranes, the vaginal douche, the intra-uterine douche, evacuation of liquor amnii ; vaginal dilatation ; dilatation of cervix ; injection of carbonic acid into uterus.

Appreciation of these methods.—Medicinal agents uncertain ; faradisation uncertain ; irritation of breasts uncertain, may cause abscess. Local agents : douche uncertain, sometimes dangerous ; intra-uterine douche has been fatal by shock and entry of air into the venous system. Rupture of membranes most certain, but it ought to follow dilatation of cervix ; dilatation of cervix alone, tedious, uncertain ; detachment of membranes from lower zone (Hamilton) tolerably certain ; bougie passed to fundus uteri and left there almost certain to excite uterine action. The injection of carbonic acid useless and dangerous.

2. *The accelerative agents.*—1. 'Expression ;' turning ; forceps ; craniotomy.

The motive principle is to bring the two factors, the body to be expelled and the resisting force, into approximate relation.

Relation to systemic condition.—(1) Developmental attraction of blood to pelvis is stopped ; (2) vascular tension is reduced ; (3) nervous tension is reduced.

Hence morbid processes which are aggravated by high nervous and vascular tension are eased.

Indications for the induction of labour.—It is strictly a medical question, ruled by consideration for the interest of (1) the mother and child ; (2) of the mother ; (3) of the child. To ensure due deliberation and to obviate moral or legal objections, the decision should be determined on consultation. The question compels us to revise the causes of dystocia.

(1) *Contraction in pelvis, i.e. down to 2.50 or 3.0 in.;*
(2) tumours, bony or other, in pelvis, cystic tumours of ovary;
(3) abnormalities of the soft parts, as tumours in the uterus, especially of the lower segment; (4) disease of the cervix or vagina, cancerous, cicatricial atresia, uterus fixed by perimetric effusions, tumours in vagina or at vulva.

Can you wait until the child is viable?—This settled in affirmative, to determine in interest of mother.

Certain cases of urgent distress of mother produced or aggravated by high vascular and nervous tension; obstinate vomiting; advancing jaundice; albuminuria, especially if attended by convulsions; some cases of insanity or chorea; hæmorrhage, especially if from placenta prævia or 'accidental'; diseases of heart and lungs.

The indications when pregnancy is complicated with phthisis.

Question of starving the mother to get small child. Error.

Cases in which the mother is presumed safe, either in labour at term or premature, the object being to rescue the child. The child has been observed to perish in utero, after reaching viability, of syphilis, hydrocephalus, disease of placenta. Anticipation of the term of gestation is also indicated when a woman has brought forth unusually large or unduly ossified children.

Premature labour or abortion is induced to remove a dead child.

Indications for inducing abortion.—Such obstruction from pelvic distortion or condition of soft parts as preclude delivery even by embryotomy at seven months with a reasonable prospect of safety to the mother. Some cases of urgent disease, as convulsions, or of advancing disease, as Bright's, which would imperil the mother if gestation continued. Irreducible retroversion or retroflexion of the uterus, or when uræmia complicates. Fixing of uterus from adhesions.

The method recommended : the time to select.—The period of the uterine flow, *i.e.* at what would be a menstrual epoch. Provocative means often fail during the uterine ebb (H. Storer).

1. Pass a No. 8 or 9 elastic bougie through the os and cervix as far as it will go. 2. Wait for uterine action. 3. When cervix is dilated enough, rupture membranes. 4. If case not urgent, watch to see if Nature will carry on labour. 5. If urgent or Nature flag, proceed to the *accelerative agents*—(1) dilate cervix by hydrostatic bags; (2) 'expression' of child alone or in aid of forceps; (3) rupture membranes; (4) forceps if cervix sufficiently expanded and head present; (5) bipolar turning, giving time for expansion of cervix by breech to ensure rapid transit of head.

Labour may be *accomplished at a predetermined hour and at one sitting*, if urgency dictate (Barnes).

Modification of proceeding under particular circumstances.—

1. In slight pelvic contraction provocation may be enough. 2. In marked contraction, acceleration by turning, taking care to carry the head in extraction round the projecting promontory in Barnes' curve. 3. In extreme deformity, craniotomy, removal of vault of cranium, flattening of bones upon the basis cranii, extraction in discoid position.

To *induce abortion*, puncture the amniotic sac. Proceed to empty the uterus under anæsthesia according to urgency.

Care after operations, similar to that of puerpera at term : rest ; quinia ; antiseptic precautions. As the child is likely to be born asphyxiated, be prepared to practise means for resuscitation.

THE FORCEPS.

CONSERVATIVE OBSTETRICS.

Powers of the forceps.—1. Compression. 2. Traction. 3. Leverage.

1. *Compression.*—The head is moulded under the normal pressure of labour during its transit through the pelvis.

A like moulding takes place in delivery by forceps, due partly to direct compression between the blades, effected by pressure on the handles, but more to the pressure encountered by the head in adapting itself to the parturient canal. This pressure serves to fix the blades upon the head.

The forceps, therefore, by bringing the head through the pelvis, aids moulding—a natural factor in labour.

Long, powerful blades and shanks which will not spring, and long handles exert more compression than short slender forceps. 'The greater the traction, the greater the pressure.' The pressure is equal to about half the traction (Delore).

Degrees of compressibility of the child's head.—The male head is less compressible than the female. An average head of a live child at term may be reduced in its bi-parietal diameter from 4 inches to 3·75. Lessening transverse diameters, or equatorial circumference, involves lengthening the long diameters; thus the occipito-frontal increases from 4·50 inches to 5·0 inches; the occipito-mental from 5·25 inches to 6·30 inches, or more. Under this moulding, a spherical head being reduced to an ovoid, cylindrical, or conoid, may traverse.

What is the extreme degree of compressibility compatible with life?—The degree above stated is compatible with life. In many cases a still further degree is compatible with life if the compression is applied slowly, gradually, intermittently, diffused smoothly over a wide surface, and if the blades seize more in the transverse than in the long diameter of the head. Experiments on the dead child are fallacious.

2. *Traction.*—This is the most obvious property. *A vis à fronte* compensates for defective *vis à tergo*.

What is the traction-force required?—It varies with the absolute and relative factors of labour. The minimum traction is needed in cases of arrest in pelvis, the relation of head to parturient canal being normal. In these cases a force equal to moving the child horizontally against slight friction, and to draw it through the vulva is enough. This may be calculated at the

weight of the child, or a little more; *i.e.* from 7 lbs. to 10 lbs. And this may be lessened by auxiliary action of the uterus, and by manual compression of the uterus. This force exerts no injurious effect upon the child.

The force required rises with the elevation of the head in the pelvis, and above the pelvic brim. In these cases the forceps must aid in moulding the head; and the distance to be traversed is greater. If there is moderate disproportion, the force must be proportionately great. The danger to the child rises in proportion to the force employed. A traction-force equal to 50 lbs. has brought forth a living child (R. B.).

3. *Leverage*.—The forceps is a double lever. Each branch acts as a fulcrum to the other. Or a fulcrum may be got against the hand of the operator, or against the wall of the pelvis. This latter is vicious, dangerous, and unnecessary. The alternate lever-action, pendulum, or oscillatory movement, will alone, in ordinary cases of arrest, bring the head to the floor of the pelvis. Thus the compression-force and traction may be economised. Tarnier's forceps involves the least waste force.

Postulates for the useful application of the forceps.—1. The os uteri must be dilated, or dilatable enough to permit the blades to pass without stretching.

2. The fruit-sac must have burst. It is not necessary to wait for evacuation of liquor amnii. Sometimes the uterus is paralysed by the liq. amnii being ponded up by the head acting as a ball-valve.

3. The pelvis should be of normal proportions, or only contracted in minor degree.

4. The head should be normal in size and firmness.

5. Empty the bladder and rectum.

6. Ether-narcosis is especially useful in the high operations.

Mode of applying the forceps.—Posture of the patient—left lateral or dorsal? Each has advantages.

Left lateral posture generally more convenient, not requiring assistants.

Dorsal posture more favourable to coincidence of uterine and pelvic axes, to manual compression of uterus to supply *vis à tergo*, and to give more power to operator at the last stage of extraction.

Application of forceps.—Take the lower blade—that which goes into the left side of the pelvis—first. *Four stages or acts*—(1) introduction of blades; (2) locking; (3) compression, traction, leverage; (4) removal of instrument.

1. *Passing the blades in left lateral decubitus.*—Left or lower blade first. Finger between posterior margin of os uteri and head guides it along sacrum, and then rotating handle upwards and backwards, point travels over head-globe and is adjusted in left side of pelvis. The other blade, then held at right angles to first blade, is guided by finger in like manner along sacral hollow, then handle depressed and carried backwards, the point travels over head-globe, and is adjusted in right side of pelvis.

2. *Locking.*—The handles carried well back against the perinæum, the locks fall together.

3. *Compression, traction, leverage.*

4. *Removal of forceps.*—As head emerges, external pressure upon blades which kept them holding the head, is lost, and blades tend to come off. At this period the perinæum and buttocks must be well compressed forwards, and to median line, whilst the handles, carried well forwards, or the blades removed, save the perinæum.

The head will be seized more or less obliquely according to the pelvic plane it has reached: thus, when above the brim the forceps will seize in oblique diameter, approaching to longitudinal; when near the outlet the forceps will seize more nearly the bi-parietal diameter. Tarnier advises to always seize in transverse diameter.

Note.—The modifications required in the use of the forceps

in different cases will be indicated when discussing the treatment of special cases.

How to use the forceps with the greatest efficiency and the least amount of force.

Rules.—1. Pull in the axis of the pelvis; thus the head encounters the least resistance. If this rule is neglected, additional force is required, increasing with every degree of angular deviation. The excess of force, moreover, bears injuriously upon the pelvic wall. (Tarnier's demonstration of the parallelogram of forces.) By treating the forceps as one lever, making the blades the resistance, the handles the force, and the lock and shanks the fulcrum, as by holding the handles in one hand during the traction, and pressing backwards upon the lock with the other hand, the resulting traction-force will be nearly in axis of pelvis.

2. Take sufficient time to allow the head to mould. Be sparing in compressing the handles. Grip only so as to hold for traction. Relax hold when not pulling. Pull during uterine contractions.

3. Combine moderate alternate lever-action with the traction.

4. Apply *vis à tergo* by a binder, or by hands of an assistant, pushing the head into the pelvis. In this way traction-force to the extent of 5 lbs. to 7 lbs. may be saved. The child's trunk is kept with its axis coincident with that of the pelvis. This implies a saving of compressive force, and lessens risk of injury from stretching the child's neck.

5. Avoid using the forceps to rotate the head. The rotation of the head should be left to the natural law of adaptation.

Description of Tarnier's forceps.

INDICATIONS FOR THE USE OF THE FORCEPS.

General rule.—If the forceps lock easily, the case is fit. Ascending from the simple to the difficult cases :—

Head in pelvic cavity.—*The low operation.*—1. Simple arrest.

2. Arrest of head in pelvis from persistent capping by the anterior or uterine valve.

3. Arrest of head in pelvis with slight impaction from disproportion or unyielding state of the soft parts.

4. Arrest of head on perinæum in an oblique or transverse position, driving-force wanting to rotate occiput forward.

5. Arrest of head in pelvis from occipito-posterior position.

6. Arrest of head in pelvis from vicious direction of driving-force from non-coincidence of axis of uterus with axis of pelvis, as with overhanging belly.

In most of the above cases, the short or straight forceps might be available, but the long forceps is better.

7. The head arrested in the pelvis, the trunk being delivered : *head-last labour*.

Head partly engaged in the pelvic brim.—The medium operation.—1. Arrest from defective driving-force.

2. Arrest from imperfect dilatation of the cervix.

3. Arrest from slight excess of child's head—minor degree of impaction.

4. Arrest from slight projection of the promontory, so that head is kept in transverse position.

5. Arrest from face-presentation ; or (1) impaction, chin forwards, occiput compressed against nucha ; or (2) chin remaining backwards, impaction from wedging of head with back of child.

Head arrested on the pelvic brim.—The high operation.—

1. Arrest from want of driving-force, inherent debility, emotion, excessive distension of uterus from liq. amnii, or twins.

2. Arrest from non-coincidence of uterine axis with pelvic axis, as in overhanging belly, or obliquity of uterus.

3. Arrest from minor degree of disproportion.

In these cases the forceps is used tentatively. If not answering, turning comes next. The cases in which forceps is applicable in 3. are comparatively rare.

Generally to avoid lingering labour.—Cases in which delivery is indicated apart from disproportion or malposition.—In the interest of the mother.

1. Hæmorrhage.
2. Convulsions.
3. To obviate exhaustion and uterine paralysis from protracted labour.
4. To obviate sloughing of vagina, vesico-vaginal fistula, and rupture of perinæum from protracted pressure.
5. To rescue the child, the mother being *in extremis*.

In some of the foregoing cases, turning or craniotomy comes into competition with the forceps: first, as elective, second, as alternative operations.

Scheme of relations of pelvic contractions to modes of delivery at term; child's head assumed to be normal.

Conjugate 4 to 4·25 in. natural delivery.

„ 4 to 3·75 in. forceps or turning.

„ 3·75 to 3·50 in. turning.

„ 3·50 to 2·25 in. turning at 3·50 in., or craniotomy, or cephalotripsy.

„ 2·25 to 1·75 in. craniotomy or cephalotripsy doubtful. Alternative, Cæsarian section.

Taking the same measurements *in labour at seven months*, by sliding down the scale of operations, natural labour takes the place of forceps, forceps of turning, turning of craniotomy, craniotomy of Cæsarian section, and Cæsarian section is eliminated.

Dangers to mother and child from use of forceps.—1. The low operation—head in pelvis, no disproportion or malposition, performed in time with proper skill, is absolutely harmless to mother and child.

2. The *medium operation*—head high in pelvis is attended by some risk to mother from protraction; from bruising or crushing soft parts of mother. Thus the obturator nerve, or

the sacral plexus may be compressed, and temporary paralysis of the parts supplied result.

The child's head has to undergo more compression : a blade may bruise the portio dura, and paralysis, temporary, of the eyelids and mouth result.

3. *In the high operation*—head on brim, the dangers rise. To the mother there is more risk of laceration of cervix uteri, of bruising the vagina. But if skilfully performed, and in time, the operation itself can hardly be said to involve mortality. To the child the risk to life from compression is serious ; but this risk is to be set against the probably greater risk of turning, and the certain destruction of craniotomy. The cranial bones are sometimes depressed, even bent, blood-effusions caused in scalp, and between dura-mater and cranium, or brain itself, injured. There is greater likelihood of injury to the portio dura. Sometimes the eye-ball is injured.

All these injuries are more probable when there is slight projection of the promontory. The depression of the skull may be due to this.

NOTE ON THE VALUE OF STATISTICS AS APPLIED TO OBSTETRIC OPERATIONS.

Gross indiscriminate statistics, seeming to show that forceps and other operations have caused a certain mortality, are fallacious. The issues of operations under different circumstances must be discriminated. Rigorous analysis on clinical lines must precede the construction of tables. Accidents which ought to be set down to delay, neglect, and unskilfulness, have been set down to operations which are essentially conservative.

TURNING OR VERSION.

CONSERVATIVE OBSTETRICS.

Definition.—Version comprehends all those proceedings by which the long axis of the child is brought into coincidence with the axis of the pelvis. Version may be—(1) spontaneous ; (2) artificial.

In spontaneous version Nature points out the object to be attained, and how to attain it; that is, by *artificial version*.

Spontaneous version may be by the head—*cephalic*; by the breech or feet—*podalic*. (See Mechanism of Labour.)

Artificial cephalic version.

Conditions favouring.—(1) The latter end of gestation before labour has set in; (2) the presence of liquor amnii; (3) moderate obliquity of the uterus and child's axis; (4) the head being near the pelvic brim.

Rationale of the proceeding.—It is strictly a *bi-polar* manœuvre; that is, regarding the child's body and head as forming a lever, force is applied to both ends or poles of the lever in opposite directions.

The operation.—It is carried out by external manipulations (Wigand; Esterlé).

1. Patient is in dorsal decubitus. Bladder and rectum empty.

2. The head lying in an iliac fossa, one hand is applied to it on the outer side, and pushes it towards the median line over the pelvic brim.

3. At the same time the other hand is applied to the fundus of the uterus containing the breech, also on its outer side, and pushes it towards the median line.

4. Thus the long axis of the child is brought into coincidence with the axis of the pelvis.

5. To maintain this coincidence, a pad is placed in the iliac fossa whence the head was dislodged, and another on the opposite side of the fundus uteri, and secured by a binder.

7. When labour sets in, the membranes are ruptured; and by artificial pressure on the uterus and uterine contractions, the head engages in the brim.

The conditions are reduced to those of natural labour. Or the head may be seized by the forceps.

In exceptional cases of mobility of fœtus the shoulder or

arm not being engaged in the brim, and the head being near, head-version may be successfully practised after labour has set in.

When the head is brought over brim, rupture the membranes.

Artificial version by breech or feet.

Conditions favouring.—1. *Before labour.*—The same as those favouring cephalic version, postulating that the breech shall be near the pelvic brim, the obliquity being slight.

The operation is the counterpart of cephalic version. It is effected by external bi-polar manœuvre. Dorsal or left lateral decubitus.

2. *After labour has set in.*—*Conditions favouring* : fruit-sac entire, or liquor amnii not all run off; child alive and mobile; shoulder or arm not impacted in pelvis; the process of 'balling' of child under persistent contraction of uterus not advanced.

The operation.—1. *The bi-polar method (bi-manual, Braxton-Hicks).*—*First stage, or version proper.*—1. One or two fingers applied to the presenting shoulder or head; tap it towards the iliac fossa in which the head lies. 2. The palm of the other hand applied to the head through the abdominal wall pushes head over to side and upwards. 3. The brim, thus cleared of head and shoulder, the hand working outside is transferred to the fundus of the uterus where the breech lies, and pushes it steadily down until—4. The fingers, searching through the os uteri, feels the knee; this is hooked by finger, and brought down. 5. Thus the lower pole of child being under command, the outside hand is again transferred to the child's head. Thus—6. Both poles being under command, by concerted movements, finger drawing down knee and hand pushing up head, trunk revolves, and the child's long axis is brought into coincidence with the axis of the pelvis. *Version* is completed.

Second stage, or extraction.—1. Two hands still act consen-

taneously. A leg is brought down, the other being left to form a half-breech presentation, the external hand or an assistant steadying, and aiding entry of trunk into pelvis. 2. Breech having cleared cervix, the other leg is grasped and axis-traction made. 3. Draw down a loop of cord to avoid dragging on umbilicus. 4. The trunk being delivered, back of child has come forward.

5. *Liberation of arms.*—The arms may run up by the sides of the head, wedging it. To liberate them, lift the child's body round the symphysis pubis; this brings down the shoulder to the perinæum. 6. Pass finger along back of humerus, placing it upon the chest, and when finger has caught the elbow, hook it out of vulva. 7. If any hitch with the other arm, lift the child's body back, curving round the perinæum; this brings the pubic arm down, when a similar manœuvre liberates it.

8. *Delivery of head.*—The legs held by one hand, two fingers of other hand hook over shoulders from the nucha. Thus diffused traction is made by consentaneous action of both hands in axis of brim, until occiput is well under the pubic arch. 9. Traction is aided by pressure externally upon the uterus. 10. If much resistance, it is better to apply forceps.

Four uses of the hand outside.—(1) It plays an essential part in bi-polar turning; (2) it steadies the uterus by counter-pressure upon the internal hand, lessening risk of laceration; (3) it helps to push the child's head into pelvis, lessening traction; (4) it is an organ of perception, giving information as to the progress of the case.

Bi-polar manipulations should be practised in the intervals of pains.

Means for resuscitation of child should be at hand.

Modifications of the operation required in particular cases: *shoulder or arm not yet impacted.*

A. *In dorso-anterior positions*.—Seize the nearest knee or foot to draw down.

B. *In dorso-posterior positions*.—Seize the farther knee. Thus the child revolves on its long axis, and the back is brought forward.

C. *When the liquor amnii is in great part drained off, and the uterus is contracting so as to resist the ordinary bi-polar manœuvre, or when child is dead*.—1. Chloroform or nitrite of amyl to relax the uterus. 2. Pass hand into uterus along abdominal surface of child, and seize, if possible, both feet or knees. 3. This hold effected, aid version by external pressure upon head. When legs and breech are brought through the os uteri, extraction proceeds as described.

The use of the sling.—When a foot has been brought into vagina, or outside, it is convenient to secure it by a sling *above the ankle*. Thus the hand is free to pass into uterus, if necessary, for the other foot.

Shoulder or arm impacted.—1. Chloroform, or nitrite of amyl. 2. Hand applied by palm and fingers to presenting part, lifting it obliquely, so as to make child revolve, and clear the brim. 3. Then fixed by external manipulations, turning as in c.

Further impaction.—‘*Balling of child*’ proceeding: uterus in persistent spasmodic action tightly embracing the child; liquor amnii spent; foetal heart no longer heard; cord felt pulseless; child dead; turning then useless as regards the child, and only to be pursued at risk of injury to mother. Therefore imitate spontaneous evolution.

Spontaneous evolution by decapitation, evisceration, or bisection of child.—The balled-up dead child forms a wedging-mass which cannot traverse the pelvis. Exhaustion, sloughing, rupture of uterus, fever threaten.

The operations.—Decapitation.—1. Chloroform useful, not necessary. 2. Pass a guide-finger along child's back to its neck; 3. Pass decapitating-hook flat along the guide-finger; 4. When neck is reached, turn the point so as to encircle the neck; 5. Bring back the guide-finger to meet the end of the hook; 6. The hook thus guarded, by sawing movement sever the head from the trunk; 7. The wedge, thus decomposed, pull upon the presenting arm, and the trunk will easily be extracted; 8. The head remains. The trunk may be bisected by strong scissors if it offer difficulty.

10. *How to remove a detruncated head remaining in utero.*—1. It may be expelled by spontaneous action; 2. Expressed by external manipulation; 3. Delivered by forceps; 4. Extracted after perforation.

This last is the surest and safest way. *The operation.*—1. An assistant fixes the head upon the pelvic brim; 2. Perforate; 3. Seize with cranioclast or cephalotribe, and extract.

Other indications than transverse presentation for bi-polar turning.—1. Some cases of *malposition of the head and face.*

2. *Prolapsus of the umbilical cord*, in which the cord cannot be replaced.

3. *Descent of a hand by the side of the head.*

4. In some cases of *minor contraction of the brim*, competing with forceps. If head cannot be drawn through brim without undue force, the labour may have to be completed by craniotomy. The occiput is perforated. Forceps seizes head in oblique or long diameter; in turning, head is compressed laterally, and moulds more easily.

5. In some *plural births*, to deliver second child.

6. *After craniotomy*, turning sometimes useful.

7. *After death of mother to rescue child*, competing with Cæsarian section.

8. Generally, when the *mother is in proximate danger*, from which speedy delivery may rescue her.

(1) In some cases of *placenta prævia*, and of *accidental hæmorrhage*. Operation facilitated by first dilating the cervix.

(2) In some cases of *urinæmic convulsions*. Chloroform or nitrite of amyl, dilatation of cervix and bi-polar turning.

(3) In some cases in which *labour has been provoked* before term on account of contraction of pelvis; bi-polar turning preferable to forceps.

Dangers to mother and child from turning.—(See note on Statistics under Forceps.)

To the mother.—1. In cases from disproportion, in which bi-polar turning can be effected without difficulty, danger is small.

2. Danger rises when liquor amnii has escaped, and persistent contraction of uterus has set in.

3. Still higher, if in addition, marked contraction of pelvis, or head large and not plastic. In the latter case force in passing hand may rupture the uterus.

4. Protracted pressure may result in sloughing; exhaustion.

To the child.—The risk is serious:—1. From compression of the cord. 2. From dragging in extraction before cervix is dilated. 3. From dragging in a vicious direction so that passage of head is delayed; and 4. Excessive traction made on its neck. If the child has been some time dead, the pelvis being contracted or not, the neck may give way, and the head be left in uterus. 5. From rotating the child on its long axis to 'give the turns,' the neck may be twisted. 6. From compression of brain in forcible dragging through narrow conjugate. The proximate parietal bone may be broken in. 7. From liquor amnii being spent, direct pressure upon placenta between child's head and the uterus. 8. From unintermittent uterine contraction utero-placental circulation is arrested.

In breech cases.—Operations analogous to version sometimes required:—1. Breech-wedging in pelvis, legs flexed. A foot is

to be seized and brought down. Thus wedge is decomposed. 2. Breech-wedging, legs extended. A foot must be seized by passing hand to fundus uteri; foot brought down by flexing leg on thigh; wedge is decomposed.

EMBRYOTOMY: CRANIOTOMY.

SACRIFICIAL OBSTETRICS.

Motive of the operation.—To reduce the child's bulk to such dimensions that it may be delivered without injury to the mother.

Analysis of the operation.—(1) Perforation of the skull; (2) excerebration; (3) extraction, simple—(a) by crotchet, or (b) by cranioclast; extraction after (a) by crushing-down cranium by removing portions of vault of cranium; by cephalotribe; (c) by lamination; (d) by breaking up base of cranium by basilyst.

The indications.—1. Such contraction of the pelvis or soft parts as will not give passage to a live child, and where forceps and turning are excluded. The pelvic contraction may be stated at 3 in. to 1·75 in. The uterine, cervical, or vaginal contractions must be determined by clinical observation of the case in hand. The pelvis may be obstructed by tumours, etc. (See 'Dystocia.')

2. Cases where obstruction is due to child. (See 'Dystocia.') Hydrocephalus, some face-presentations, excessive size; and—

3. Cases where woman is in danger, rendering it expedient to deliver as speedily as possible, and where craniotomy is the quickest way, involving least violence to woman; some cases of hæmorrhage, of convulsions, great exhaustion, rupture of uterus; and generally where, prompt delivery being indicated, the cervix uteri is not sufficiently dilated to admit of conservative

operations; also in cases of dystocia, the child being dead, craniotomy is preferable.

The operation.—Preparation.—1. Empty bladder and rectum. *Posture of patient* lateral or dorsal.

1st Act. *Perforation.*—1. The head is fixed upon pelvic brim by assistant, to give counter-pressure. 2. The index of operator (the whole hand in vagina if necessary) explores circumference of head, and dimensions and shape of pelvis, determines impaction or arrest, and defines the margin of the cervix uteri. 3. The index set upon most accessible part of head, os uteri clear, the craniotome is applied perpendicularly to perforate and make a crucial opening.

This act—*perforation simple*—is enough in some cases of minor disproportion. The head is then moulded by uterine action and expelled.

2nd Act. *Excerebration*, or emptying the skull.—The crotchet is introduced, turned round to break up tentoria and brain.

Perforation and excerebration, combined, enough in some cases. Head collapses, moulds, and is expelled.

3rd Act. *Extraction.*—Craniotomy-forceps, one blade inside, the other outside skull; grip and screw for traction. Head moulds in adaptation to pelvis. Useful in higher disproportion.

4. *Extraction preceded by breaking up cranial vault and removing pieces of calvarium.*—1. One blade of cranioclast passed inside skull, the other between scalp and bone; the bone is broken off and removed. 2. Head then collapses more easily, and cranioclast again applied to seize and extract.

This proceeding is adapted to deliver in extreme disproportion. If, after picking off several pieces of calvarium, head be seized in mento-frontal diameter, remains of calvarium are crushed down on base, and head is extracted flat like a disc. It then competes with cephalotripsy and Cæsarian section (Osborn; Burns; Braxton-Hicks; Barnes).

5. *Extraction after cephalotripsy.*—1. After perforation. 2. Seize head by cephalotribe as by forceps. 3. Crush down. 4. Extract; or 5. If resistance great, remove instrument, readjust in a different direction, and crush again. 6. If still difficult, rotate head by the instrument to get a more favourable position.

Action of the cephalotribe.—It crushes the disintegrated vault of cranium down on its basis, so that head is extracted flat like a disk.

The cephalotribe may be applied in all degrees of disproportion, except in the most extreme.

6. *Extraction by lamination, or slicing up the head.*—By Van Huevel's forceps-saw; by *écraseur* (Barnes).

The *écraseur* answers better than the forceps-saw in extreme cases, taking less room to work.

7. *Extraction after breaking up the base of the skull.*—(1) Perforate; (2) excerebrate; (3) pass the basilyst to the base of skull through the opening made by craniotome; drill into the base; (4) by cephalotribe or cranioclast, crush and extract.

Competes with cephalotripsy, cranioclasm, and Cæsarian section in extreme cases.

8. In some cases not of extreme contraction it may be convenient to *extract by turning*.

The dangers that attend craniotomy.—1. The *jutting promontory* has been mistaken for the head, and the perforator has been driven into it, lacerating intermediate tissues.

2. The *cervix uteri* may be torn by the perforator.

3. *Spicula of cranial bones* resulting from perforation may tear the soft parts.

4. The *crotchet* may slip and tear the soft parts.

5. *Necrosis of soft parts from long pressure*, from delay in operating, or severe traction where disproportion is excessive,

resulting in perforation of soft parts, sloughing and death, or fistula.

How to avoid the above accidents.—1 and 2. By careful examination, sweeping a finger round the head between it and the os uteri before perforating. 3. Carefully picking away projecting bits of bone before extraction. 4. Never use the crotchet for extraction. 5. Operate in time, and if resistance is great, resume breaking up and picking away bits of cranium before extracting.

Mortality attending craniotomy.—If performed in fitting cases, at fitting time, and skilfully, it is a conservative operation for the mother; the mortality strictly is *nil*. (See note on Statistics under 'Forceps.')

THE CÆSARIAN SECTION.

CONSERVATIVE IN DESIGN.

The *motive* is still the same as that which dictates craniotomy, namely, to save the mother. Although much more dangerous to the mother, it has the merit of not being sacrificial as regards the child.

Definition.—By the Cæsarian operation the child is extracted by an opening made in the abdominal wall and uterus.

The indications.—1. To deliver a child which cannot be drawn through *vias naturales*, whole or mutilated, without greater danger to the mother. These cases are—(a) *Extreme contraction of the pelvis*, the conjugate reduced below 2 in. (b) *Some tumours blocking the pelvis*. (c) *Fibroid tumours* of the lower segment of the uterus. (d) *Malignant disease* of the lower segment of the uterus. (e) *Extreme cicatricial or morbid states of the vagina or vulva*.

2. *To rescue the child from a moribund or recently dead mother.*—This raises the question—*How long may a child in*

utero survive its mother? Cases are recorded of live children being extracted ten minutes after mother's death.

The operation has been regarded as—(1) *necessary*; (2) *elective*.

In what cases is it necessary? In almost all cases above stated. *The elective cases* will be few. If the physician be devoid of proper instruments, and the skill to deliver after craniotomy when the conjugate is 2·0 in. or a little below, he may elect the Cæsarion section.

Questions preliminary to operation.—*What is the best time to select?* It being assumed that the woman is near term of gestation—1. In some cases the woman being in labour, there is no choice. 2. In the case of a woman seen early in gestation, a choice may lie between the induction of labour at a selected time, or of waiting till term, and performing Cæsarion section. If premature labour offer a fair prospect of safety to the mother, it is selected. If the risk of labour, premature or at term, be held even, going to term is selected as prolonging the mother's life, and giving a better prospect for the child. Cases of cancer of the uterus will raise this question. 3. If premature labour be excluded, labour may be—(a) waited for; or (b) provoked at term; or (c) the operation may be performed at term without waiting for or provoking labour. It is generally held to be wiser to operate during labour so as to enlist the natural powers; and early, so as to obviate the dangers proper to protracted labour (Winckel). 4. If cancer invade the cervix, the surrounding tissues yet free, the case coming under observation—(a) before child is viable, the entire uterus may be removed; or (b) if the above conditions are observed when the child is viable, the Cæsarion section after the manner of Porro is indicated. The same argument applies to some cases complicated with fibroma of the uterus.

The operations.—A. Cæsarion section simple; B. Porro's operation; C. Laparo-elytrotomy; D. Cæsarion section, plus removal of the ovaries.

A. *Cæsarian section simple*.—1. Abdominal incision in median line from umbilicus to near symphysis. 2. Uterine incision, avoiding fundus and lower segment as much as possible. 3. Open fruit-sac and seize child by feet. 4. Remove placenta. 5. Check hæmorrhage by compression. 6. Pass a finger through the os uteri to ensure drainage. 7. When uterus contracts, cleanse the peritoneal cavity; question of stitching up uterine wound. 8. Close abdominal wound.

B. *Porro's operation*.—1. This consists in the Cæsarian section as above. 2. The uterus emptied, it is drawn forward out of the abdomen, and ligated by Cintrat's *serre-nœud* just below the os internum. 3. The uterus and adnexa are then amputated. 4. The stump is fixed outside the abdominal wound. 5. The abdomen is closed by sutures. Müller has modified this operation as follows: he opens the uterus after drawing it out of the abdomen, and applying the *serre-nœud* to obviate bleeding when the uterus is laid open.

C. *Laparo-elytrotomy* (V. Ritgen; Baudelocque; Thomas).—1. An incision, usually on the right side, is made from above the pubes to the ant. sup. spine of the ilium. 2. The peritoneum is raised, and the vagina just below its insertion into the cervix is partly cut, partly torn through. 3. The child is then extracted through the os uteri.

D. *Cæsarian section plus removal of the ovaries*.—1. Cæsarian section as in A. 2. The ovaries are amputated.

Appreciation of the above operations.—Shock is inherent to all. It is greater in Porro, B. Hæmorrhage is specially dangerous in Cæsarian section simple, A—(1) from placental site, (2) from uterine wound. This danger is greater if operation is done after protracted labour. Hæmorrhage may be controlled by firm compression until uterus contracts. If persistent, placental site may be staunched by perchloride of iron, and the uterine wound secured by sutures. Escape of dis-

charges into peritoneal cavity is obviated by sewing up the uterus, and uniting the uterus to the abdominal wall (B. Hicks; Tarnier; Barnes). Müller's modification of Porro was designed to obviate hæmorrhage. It has been found difficult to draw the full uterus through even a very free abdominal wound. Greater shock is entailed. Very little is saved in the way of hæmorrhage. The advantage of the proceeding over Porro's is very doubtful. *Laparo-elytrotomy* (c) has the advantage of not opening the peritoneal cavity. If the cervix uteri is not dilated enough, time may be lost in dilating before the child can be extracted. The child's chance is less, the mother's not greater than in Porro. *Cæsarian section plus removal of ovaries* (d). The removal of the ovaries obviates future pregnancy, and entails less mutilation than Porro's operation. Porro's operation is especially indicated when there is disease of the uterus.

Alternatives for the Cæsarian section, other than craniotomy.

1. *Symphyseotomy: The Sigaultian operation.*—Based upon the natural relaxation of the pelvic joints in pregnancy. *Motive*—to enlarge capacity of pelvis by stretching the joints. 1. The symphysis pubis is divided. 2. The pubic bones are then forced apart, and the sacro-iliac joints yield a little. Gain from $\frac{1}{6}$ to $\frac{1}{2}$ in. conjugate diameter. This may be enough to permit a live child to pass by turning or forceps, thus avoiding craniotomy. Morisani says that by it 41 out of 50 foetal lives were saved. Result to mother not favourable. If she recover she is likely to be lame.

2. *Forcible dilatation of the osteomalacic pelvis.*—Based upon the plasticity of the pelvic bones in osteomalacia.—(1) The hand is slowly passed into pelvis, and the bones gradually opened out by excentric pressure; (2) then delivery by turning or craniotomy (Tyler Smith; Lazzati). Frequently performed in Milan instead of Cæsarian section.

Improvements in the Cæsarian operation will probably extinguish symphyseotomy, and encroach on the domain of craniotomy.

Mortality attending Cæsarian section.—1. To mothers. Very difficult to estimate. Operations performed on women exhausted and injured by long labour, cannot fairly tell against operations performed under best conditions. The mortality will certainly diminish with the progress of science. 2. To children the operation is distinctly conservative. If done in time, the loss ought hardly to be greater than attends forceps or turning.

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